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Book Review

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**THE
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Editors' Note

There has been exceptional delay in bringing out the current issue of our journal due to a number of unavoidable administrative problems. The Editorial Board of the journal wishes to convey its sincere regrets for this delay to all its patrons and subscribers. An all-out effort is being made to make up for the lag by bringing out the subsequent issues at very frequent intervals.

Two changes are being introduced starting with the current issue of the journal. From now on, the contributors of articles (excluding notes, correspondences etc.) will be required to submit abstracts (not exceeding 200 words) of their papers; and if selected for publication, the abstracts will be published alongwith the papers. Secondly, it has been decided to discontinue the practice of designating the four issues corresponding to the four quarters of a year by the name of the first month of the respective quarters. Instead, they will be designated by the names of four major seasons in Bangladesh e.g., Winter, Summer, Monsoon and Autumn. Accordingly, the current issue which would have been called the "January issue" according to past practice is now called the "Winter issue".

Trade, Output and Employment : A Case Study of Bangladesh

by

SADREL REZA*

This paper focuses attention on the output and employment potential of alternative trade strategies for the industrial economy of Bangladesh. The analysis involves two basic stages. At stage I, the input requirements of the various industrial sectors of the economy are estimated in an input-output framework. At stage II, the comparative factor intensities of export expansion and import substitution as calculated in the simple Leontief tradition, from which estimates the output and employment implications of trade in manufactures are then directly deduced. The findings in this study indicate that the industrial exports and import substitutes of Bangladesh do not differ significantly in their implications for (unskilled) labour employment. Export promotion, however, is likely to have a considerably higher output potential, for a given amount of investible resource, as compared to a policy of import substitution.

I. INTRODUCTION

The main object of this paper is to estimate (1) the output and (2) the employment¹ potential of an export promotion (EP) and an import substitution (IS) strategy of industrial growth for Bangladesh.² Since Bangladesh is a labour surplus country which is characterized by severe scarcities of both capital and foreign exchange,³ the two basic hypotheses that we propose to test in this study can be stated as follows :

(i) First, if it can be shown that the exports of Bangladesh relative to import substitutes are more labour-intensive, then an EP strategy shall generate

*The author is an Associate Professor, Department of Economics, University of Dacca. This paper is based on Chapters VIII—X of his doctoral dissertation [24]. He would like to express his sincere thanks to Dr. Deepak Nayyar of the University of Sussex for many helpful comments on a number of earlier drafts. However, the author alone is responsible for any errors that may still remain.

¹For the sake of analytical convenience we ignore the various ambiguities relating to the concepts of both output and employment [28]. It is simply assumed that our only concern is with the current levels of output (valued at current prices) and employment (e.g., average daily employment).

²The period of the analysis is restricted to the 1960s only for reasons to be shown in Section III.

³The country, it is to be noted, is also characterized by the scarcity of human capital. The skill factor in trade, however, has been dealt with elsewhere by the author [24].

more employment, for a given level of investment, as compared to an IS strategy.

(ii) Second, if it can be shown that the exports of the country relative to import substitutes require less of the scarce productive factors like capital and foreign exchange, then it will follow that an EP strategy, by means of a better allocation of resources, will have a greater income generating effect as compared to an IS strategy.

The paper is organised as follows. Section II sets out the methodology employed in testing the hypotheses given above. In Section III we present the basic data used in the exercise, along with some brief comments on the nature and sources of the statistics. The main findings of the study appear in Section IV, which are followed by the interpretation of the results in Section V. Finally, Section VI provides some concluding observations along with a brief summary of the findings.

II. METHODOLOGY FOR TESTING THE HYPOTHESES

The basic methodology will involve in two stages shown below. First, at Stage I, the input requirements of the various sectors of the industrial economy of the country will be estimated in an input-output framework. Second, at Stage II, given the estimates derived at Stage I, and with the help of the actual manufacturing trade figures, an effort will be made to measure the comparative input requirements of export expansion and import substitution. From these exercises, it will then be possible to directly deduce the income and employment implications of trade in manufacturers.⁴ The methodology can now be set out as follows :

Stage I

Let us begin with the following notations :

X_i = the annual total output of industry i ,

X_{ij} = amount of i absorbed annually as intermediate inputs by industry j ,

$a_{ij} = \frac{X_{ij}}{X_j}$, i.e., the amount of i required to produce one unit of j
(the technical coefficients of production),

Y_i = amount of i produced to satisfy final demand.

⁴The employment implications can be directly seen from the labour input requirements. The income implications however, are indirectly deduced from the differential requirements of the various sectors for the scarce inputs. For example, if Sector I needs less of scarce inputs for a given level of output as compared to Sector II, then Sector I may be said to have a higher income generating capacity. See Section V.

The overall input-output accounting balance for the economy can now be described in familiar terms of n linear equations :

$$\sum_{j=1}^n X_{ij} + Y_i = X_i \text{ where } i = 1, 2, \dots, n \quad (1.1)$$

Now $X_{ij} = a_{ij} X_j$; therefore substituting for X_{ij} in (1.1) we obtain the following expressions :

$$\sum_{j=1}^n a_{ij} X_j + Y_i = X_i \text{ where } i = 1, 2, \dots, n \quad (1.2)$$

By transposing terms, we obtain,

$$X_i - \sum_{j=1}^n a_{ij} X_j = Y_i, \quad i = 1, 2, \dots, n \quad (1.3)$$

For convenience, we can rewrite system (1.3) in terms of matrix and vector notation as :

$$X - AX = Y, \quad (1.4)$$

Where, X = a column vector of total output consisting of n elements,

A = a square matrix of technical coefficients of production, (i.e. a_{ij}),

Y = a column vector of total final demands,

AX = total intermediate demand.

We can now premultiply both sides of system (1.4) by the identity or unit matrix (I) to obtain the following expression :

$$IX - AX = Y \quad (1.5)$$

Factoring out the X column vector yields the very familiar expression of the input-output analysis :

$$(I - A) X = Y \quad (1.6)$$

Premultiplying both sides of system (1.6) by $(I - A)^{-1}$ the following expression can be obtained :

$$X = (I - A)^{-1} Y \quad (1.7)$$

The expression $(I - A)^{-1}$, the inverted Leontief matrix, is usually designated by the block letter 'R'. Hence, system (1.7) can also be written as :

$$X = R.Y \quad (1.7a)$$

which is the same thing as the algebraic expression,

$$X_i = \sum_{j=1}^n r_{ij} Y_j, \quad i = 1, 2, \dots, n \quad (1.7b)$$

Where r_{ij} is the element of the i th row and the j th column of the inverted Leontief matrix.

In order to measure the probable effects of any change in final demand on the total output of all sectors of the economy, we need merely to rewrite system (1.7) as :

$$\Delta X = R \Delta Y \quad (1.7c)$$

$$\text{Or, } \Delta X_i = \sum_{j=1}^n r_{ij} \Delta Y_j, \quad i = 1, 2, \dots, n \quad (1.7d)$$

Stated differently, the above system determines the direct and indirect output requirements per unit increase in final demand. From this stage the next step at estimating the direct and indirect input requirements is an easy one, assuming that there is a unique relationship between input used and the amount of total output produced by a particular industry. Thus in order to ascertain the amount of labour employed in industry i , we need only to multiply the corresponding labour coefficients l_i by the total output of that sector. The total industrial employment is then given by the expression :

$$L = \sum_{i=1}^n l_i X_i \quad (1.8)$$

Where, L = total industrial employment,

$$l_i = \frac{L_i}{X_i}, \quad i = 1, 2, \dots, n$$

and, L_i = Level of employment in i ,

X_i = total output of i .

For incorporating changes in the system, equation (1.8) can be expressed with the Δ signs as follows :

$$\Delta L = \sum_{i=1}^n l_i \Delta X_i \quad (1.8a)$$

Now, the change in employment as a result of a change in final demand can be calculated by substituting equation (1.7d) into (1.8a).

$$\text{Thus, } \Delta L = \sum_{i=1}^n l_i \left(\sum_{j=1}^n r_{ij} \Delta Y_j \right) \quad (1.8b)$$

$$\text{or, } \Delta L = \sum_{i=1}^n \sum_{j=1}^n l_i r_{ij} \Delta Y_j$$

In matrix notation we have,

$$\Delta L = l(I-A)^{-1} Y \quad (1.9)$$

where,

l = the diagonal matrix with l_1 (i.e., showing labour coefficients) along the diagonal,

ΔL = matrix of direct and indirect labour requirements in sector i as a consequence of a change in final demand for sector j 's product. The sum of elements of column j of this matrix will show the total (economy wide) increase in employment due to that change in final demand.

The direct and indirect changes in the requirements for other inputs can likewise be measured. All we have to do is to substitute l by the other relevant coefficient. For example, in the case of capital,⁵ we replace l_1 's by the capital coefficients C_1 's $i = 1, 2, \dots, n$

$(C_1 = \frac{C_i}{X_i})$ where C_1 = capital used in sector i and X_i represents the total sectoral output. In matrix notation, then, we will have :

$$K = c (I - A)^{-1} Y \quad (1.10)$$

where, c = the diagonal matrix with c_1 (i.e., showing capital coefficients) along the diagonal,

ΔK = matrix of direct and indirect capital requirements in sector i as a consequence of a change in final demand for sector j 's product. The sum of elements of column j of this matrix will show the overall increase in capital requirements due to that change in final demand.

Similarly, direct and indirect imported input requirements (i.e., foreign exchange) can also be estimated. In matrix notation, then, we will write:

$$\Delta F = m (I - A)^{-1} \Delta Y \quad (1.11)$$

where, m = the diagonal matrix with $m_1 = \frac{M_1}{X_1}$

(where M_1 = value of intermediate import of sector i) along the diagonal, ΔF = matrix of direct and indirect imported input requirements in sector i as a consequence of a change in final demand for sector j 's product. The sum of elements of column j of this matrix will show the total change in import requirements due to that change in final demand.

Stage II

It should now be possible to calculate⁶ the factor intensities of exports and imports in the simple Leontief tradition [17]. Assume that total imports

⁵Measurement of capital is a controversial issue. See, for example [8]. For the method used here see Section III.

⁶Given, of course, the relevant trade data.

are reduced by 100,000 takas⁷ such that import of each commodity is reduced proportionately; then the total amount of the various inputs needed for the same taka worth of import replacement can be estimated as follows :

$$L^M = \sum_{i=1}^n L_i W_i^M \quad (2.1)$$

$$K^M = \sum_{i=1}^n K_i W_i^M \quad (2.2)$$

$$F^M = \sum_{i=1}^n F_i W_i^M \quad (2.3)$$

where L_i , K_i , and F_i show the direct and indirect sectoral requirements of labour, capital and import (foreign exchange) respectively, as derived at Stage I. W_i^M is the weight of commodity i in total imports.⁸

Analogous calculations will give the total amount of the various inputs needed when exports are assumed to expand proportionately, say by 100,000 takas.

Thus, we will have the following :

$$L^X = \sum_{i=1}^n L_i W_i^X \quad (2.4)$$

$$K^X = \sum_{i=1}^n K_i W_i^X \quad (2.5)$$

$$F^X = \sum_{i=1}^n F_i W_i^X \quad (2.6)$$

where, W_i^X is the weight of the commodity i in total exports.⁹ It should be noted here that we are concerned with the implications of trade in manufactures only and that, therefore, zero values are assigned in the above system to non-manufacturing exports and imports.

⁷Taka (Tk) is the name of the Bangladesh currency. Its present official value approximately is £=Tk.28.

⁸It needs to be pointed out that the expansion of output in the import competing industries will absorb resources which, at least potentially, have alternative uses in the (i) export sector, and (ii) non-traded goods sector. While the implications of expanding the export sector relative to the import replacement sector will be analysed here, the non-traded goods sector falls outside the scope of our present study (which, thus, admittedly is partial in view).

⁹Again, expansion of exports will draw resources which have used in alternative sectors and our model analyses the implications of expanding the export industries only, leaving out the non-traded goods sector.

From the above what follows is that the total direct and indirect input requirements, and hence the employment and income implications of a given level of trade in manufactures (exports or imports) will depend primarily on the following two factors : (i) the composition of exports or imports, and (ii) the average value of the input coefficients. Clearly the future income and employment potential of manufactured exports or imports will depend, apart from changes in their own quantities, on the way the changes in the two above mentioned factors interact with each other. For example, other things remaining the same, if the export composition changes in the direction of labour-intensive goods, the employment attributable to manufactured exports will also increase. Again, if the sectoral technical coefficients change, their income and employment potential will be determined, *ceteris paribus*, by the differential rates of such changes. Thus, one can deduce various possible effects by making alternative assumptions about changes in both the trade composition and technical coefficients.

III. THE RELEVANT DATA

The nature and sources of data can be examined under the following three main headings, viz., (a) input output tables, (b) labour and other resource coefficients and (c) the composition of foreign trade.

(a) Input-Output Tables

The basic statistical material comes from the 23 sector 1965/66¹⁰ input-output table for the industrial economy of Bangladesh, constructed by Singh [27], and aggregated by us for the purpose of the present study, into 21 sectors. Such aggregation as needed to make the sector classification conformable with some other previous inter-industrial analyses on the economy of Bangladesh [15; 19]. This not only facilitates comparison between the different studies but also helps us with the use of some materials already available in other works.¹¹ It should further be noted that although we use the Singh input-output table, the sector codes used here are the ones given for the 1962/63 input-output table in Khan and MacEwan [15] and the 1964/65 table in MacEwan [19].

¹⁰The years in this paper, unless otherwise specified, refer to the corresponding fiscal period in Bangladesh, i.e., July-June.

¹¹For example, we use the 1964/65 import figures as given in MacEwan [19]. These figures at both c.i.f. and purchasers' prices, as we shall later see in the analysis, saved us lot of laborious and unnecessary statistical work.

TABLE I

TWENTY-ONE SECTOR 'A' MATRIX OF TECHNICAL COEFFICIENTS—STRUCTURE
OF THE INDUSTRIAL ECONOMY OF BANGLADESH, 1965/66²

Sector	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	28	29
5. Teab	.2125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Sugar	0	0	0	0	.0448	0	0	0	0	.0001	0	.0050	0	0	0	0	0	0	0	0	0
8. Edible Oils	0	0	.1850	0	.0188	0	0	0	0	0	.0089	.1065	0	0	0	0	0	0	.0027	0	0
9. Tobacco	0	0	0	.0012	0	0	0	0	0	0	0	.0001	0	0	0	0	0	0	0	0	0
10. Other Food	0	0	0	0	.1264	0	0	0	0	0	0	.0039	0	0	0	0	0	0	0	0	0
11. Cotton Text.	0	.0002	0	0	.0005	.0057	.0011	.0552	0	0	.0203	0	0	0	0	0	.0094	0	0	0	0
12. Jute Text.	0	.0153	.0037	0	.0051	.0078	.0002	.0459	0	.0002	0	.0004	.0713	.0002	0	0	0	.0025	.0004	.0001	0
13. Other Text.	0	0	0	0	0	.0014	0	.0645	.0001	.0027	.0208	0	0	0	0	0	.0003	.0001	.0011	.0746	0
14. Paper	.0010	0	.0001	.2076	.0081	.0007	0	.0031	.1911	.0055	.0109	.0041	.0262	.0059	0	.0010	.0008	.0025	.0021	.0021	0
15. Leather	0	0	0	0	0	0	0	0	0	.0520	0	0	0	0	0	0	0	0	0	0	0
16. Rubber	0	0	0	0	0	0	0	0	0	.0068	.1080	0	0	0	0	0	0	.0005	0	0	0
17. Fertilizer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18. Other Chem.	.0007	.0036	.0016	.0045	.0061	.0032	.0013	.0145	.0200	.0969	.0897	.0527	.0031	.0012	.0144	.0062	.0355	.0612	.0278	.0204	0
19. Cement	0	0	0	0	0	0	0	0	0	0	0	0	0	.0547	.0008	.0003	.0009	0	0	.0146	0
20. Basic Metals	0	.0002	0	0	0	.0001	0	.0015	0	0	0	.0044	.0170	.4966	.2011	.0262	.0069	0	.0046	.0009	0
21. Metal Prod.	0	0	.0263	.0149	.0038	.0031	.0046	.0092	.0039	.0115	0	0	0	.0155	.0135	.0093	.0331	.0006	.0039	.1112	0
22. Machinery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0512	.0025	0	0	0
23. Transport Equip.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0036	0	0	0
24. Wood, etc.	.0299	0	0	.0094	.0013	0	0	0	.0075	.0042	0	.0251	0	0	.0016	.0159	0	.0540	.0724	.0004	0
28. Misc. Manuf.	0	0	0	0	.0014	0	0	.0001	.0061	.0026	.0190	.0082	.0110	.0004	.0011	.0014	.0005	.0134	.0972	.0018	0
29. Coal, etc.	0	.0012	0	0	0	0	.0004	0	0	0	0	.0072	0	.0005	0	.0002	.1276	0	.0004	0	0

Source : Aggregated from [27] using sector codes of [19].

Notes : ^aAt current purchasers' prices.^bRefers to manufacturing only as opposed to both tea growing and manufacturing in MacEwan [19].

Let us now present, in Table I, the Singh 'A' matrix of technical coefficients for the industrial economy of Bangladesh. The Singh table, it should be noted, has at least two drawbacks. First, it is a partial input-output system pertaining only to the industrial activities and is of an 'open' type; among other things, for example, the inputs coming to the industrial sectors from agricultural and mining sectors, are shown as rows outside the transactions matrix. In other words, the model only shows the dependence of the industrial system on agriculture, mining, etc., for inputs and not vice versa. The assumption underlying such an exercise is that the interdependence of the raw material based sectors on the primary sectors, e.g., agriculture and mining, is unidirectional. Such an assumption is obviously subject to question and therefore, to some extent, imposes a limitation on the usefulness of the model [2]. The second drawback of the table is that it is based on the Census of Manufacturing Industries (CMI) data [3] which relate to the organised industrial sector and cover only the large and medium-scale manufacturing establishments in the country.¹² Since an unknown number of factories remained outside the scope of the census, they also remained unaccounted for in the input-output table. In terms of national accounts this probably implies that less than one-third of the value added in manufacturing has not been covered by the census¹³ and hence, results derived from the input-output system should not, by any means, be regarded as a conclusive guide for policy formulation.

All the same, we found it desirable to use the Singh model for a number of reasons. First, it is the latest input output table available for the industrial economy of Bangladesh and should, therefore, be expected to reflect more closely the technological conditions prevailing in the country as compared to other previous tables.¹⁴ Second, the other input-output tables are also not without

¹²The CMI covers only those industries which are registered with the Chief Inspector of Factories, under section 2(j) and 5 (i) of the Factories Act, 1934. 2(j) refers to units which employ 20 or more workers with use of power. 5(i) refers to units employing 10 or more workers without the use of power, and between 10 and 19 workers with the use of power. It should be noted that factories, registered under section 2(f) of the Factories Act, 1965, are also covered in later censuses. 2(f) refers to units employing 10 or more workers with or without the use of power, but not including a mine subject to the operation of the Mines Act, 1923.

¹³This proportion refers to the late sixties, see [4].

¹⁴It should be noted that the Bangladesh Planning Commission prepared a complete 33-sector input-output table for the economy of Bangladesh (mimeographed), which refers to a later year, possibly to 1969/70. Unfortunately, we could not use this table because it contained some serious (printing ?) mistakes. For example, it shows some $a_{ij} > 1$ which would not only be irrational from the business point of view, but also violates the input-output criterion that for every sector the value of total output must equal the value of total inputs.

shortcomings and on the whole may not be superior to the tables used here.¹⁵ An alternative way of going about the problem, however, would have been to construct our own input-output table for a later year and on a more comprehensive basis, but this would involve an immense amount of statistical computation which is clearly beyond the scope of this work.

(b) Labour and Other Resource Coefficients

The relevant information in this regard is given in Table II; columns 1 and 2 showing respectively the average employment and non-competitive imported input (concepts to be analysed shortly) requirements of the various sectors for the corresponding levels of their output shown in column 3. Columns 4–6 show the amounts of the different factors needed per taka worth of output.

A few words now on the nature and meaning of the various productive factors listed in Table II are in order.

(i) Labour Employment

To keep ourselves free from the controversy surrounding the concept of employment,¹⁶ we refer by labour employment only to those persons who were actually engaged, paid or unpaid, in various industrial establishments and were reported as such in the CMI. The use of the CMI figure, as already noted, has some obvious shortcomings which are even more pronounced in the realm of employment. For example, around the mid-Sixties, the CMI data accounted for employment of only about 0.2 million persons as against a possible total industrial employment (i.e., covering small and cottage industries) of about 1.3 million persons.¹⁷

¹⁵For example, MacEwan's [19] is a complete input-output system (incorporating the primary sectors and small-scale industries, but excluding cottage industries) for the Bangladesh economy for the year 1964/65. This represents superiority over the Singh model which is only a partial system. However, in MacEwan the technical coefficients are incremental (which has its own usefulness) which are based on his anticipations about the important structural and technical changes that were to take place in the economy in 1974/75 [19; p. 26]. Apart from the fact that such assumption about the changes are bound to be arbitrary in the context of Bangladesh, they are likely to have been rendered totally unrealistic by the war of Independence in 1971 and the consequent break-up of Bangladesh's union with Pakistan.

¹⁶According to Sen [26], for example, there are at least three different aspects of the concept of employment namely, (i) the income aspect (employment gives income to the employed), (ii) the production aspect (employment yields output), and (iii) the recognition aspect (employment gives a person recognition of being engaged in something fruitful). The measurement of employment may vary widely depending on which of these definitions are accepted.

¹⁷The total industrial employment, it should be noted, accounted on average for about only 7.5 per cent of the country's total available civilian labour force during the indicated period [4; 14].

TABLE II

**LABOUR, IMPORTED INPUT AND CAPITAL (FIXED) REQUIREMENTS :
BANGLADESH INDUSTRIAL ECONOMY, 1965/66**

Sector	(1) Average Daily Emp- loyment (L_1) (number of workers)	(2) Non-Compe- titive Import- ed Inputs (M_1) (in thou- sand takas)	(3) Total Output (X_1) (in thousand takas)	(4) Labour Co- efficients (li) $= L_1/X_1$ (Col. $1 \div$ Col.3)	(5) Imported Input Co- efficients (m_1) $= M_1/X_1$ (Col. $2 \div$ Col.3)	(6) ^a Capital (fixed) Coefficients (C_1)
5. Tea	9,968	2,457	325,635	.000031	.0076	1.1369
7. Sugar	5,812	1,593	149,536	.000039	.0107	1.0248
8. Edible Oils	2,202	1,402	133,567	.000016	.0105	0.1575
9. Tobacco	2,791	20,641	214,737	.000013	.0961	0.2638
10. Other Food	5,909	877	107,085	.000055	.0082	0.3992
11. Cotton Text.	23,597	1,051	201,034	.000117	.0053	0.7704
12. Jute Text.	83,934	9,922	999,038	.000084	.0099	1.2426
13. Other Text.	11,634	2,005	132,170	.000088	.0152	0.4295
14. Paper	20,477	6,553	157,568	.000066	.0416	1.1906
15. Leather	4,317	231	58,043	.000074	.0040	0.2845
16. Rubber	1,419	1,364	16,696	.000084	.0817	0.5123
17. Fertilizer	1,625	9,676 ^b	265,304 ^b	.000082 ^b	.0365 ^b	1.9605
18. Other Chem.	20,185					0.3952
19. Cement	605	867	8,707	.000069	.0996	0.7709
20. Basic Metals	1,835	15,194	79,830	.000023	.1904	0.7031
21. Metal Prod.	7,974	31,198	82,409	.000097	.3786	0.4679
22. Machinery	3,138	5,717	45,721	.000069	.1250	0.8390
23. Transport Eq.	5,269	11,188	59,748	.000088	.1872	0.7611
24. Wood, etc.	1,643	326	13,750	.000119	.0237	0.6786
28. Misc. Manuf.	5,679	2,407	24,948	.000228	.0965	0.7991
29. Coal. etc.	44	3,641	10,168	.000004	.3581	1.1096 ^c

Sources : [3] for column 1; [24] for columns 2-3; and [19] for column 6.

Notes : ^aIncremental ratios for 1964/65 (rounded to 4 digits after decimal point).

^bSectors 17—18 combined.

^cRefers to Pakistan (ratio not available for Bangladesh).

However, in spite of this limitation, there are several overriding considerations which dictate the use of the CMI figures. First, full sector-wise data on employment of all the manufacturing firms in the country, including the unregistered small-scale and cottage establishments are not available.¹⁸ Secondly, it is advisable to use the CMI figures because of their consistency with the data base of the input-output tables used here. Thirdly, the CMI data on employment, inspite of the under-coverage are more reliable when compared with the vague and often misleading estimates that can be made with the help of some other definitions.¹⁹

(ii) Other Resource Coefficients

The imported input figures have been taken from Singh [27], who bases his estimates on CMI figures. These estimates involve, in addition to the statistical problems related to the CMI figures, some methodological issues as well. The method followed by Singh, "...has been that if an item appeared as an input in the industrial system but did not appear in the detailed classification of products and by products of any industry, it was classified as non-competitive import" [27, p. 220]. In other words, those imports have been regarded as non-competitive for which no domestic capacities existed. Such a definition is obviously based on the extreme assumption that all imports can be distinctly classified to belong to either of the following two categories : (i) those which are competitive with domestic production; and (ii) those which are complementary to (i.e., non-competitive with) domestic production, and are determined endogenously through some fixed coefficients (or some other kind of function) relating such imports to the output levels of the using sectors [13]. Usually, it is the non-competitive imports (used synonymously with complementary imports) which set the floor demand for foreign exchange. Any surplus foreign exchange that may remain after meeting these needs is then made available for distribution among the competitive imports. It should be

¹⁸The then East Pakistan Small Industries Corporation carried out two surveys, one on small-scale industries for the year 1963/64 and the other on cottage industries for the calendar year 1962. Apart from the fact that there was no check on these data by subsequent surveys, and that an element of overlap with the CMI data is likely, (the sector classification of the small and cottage industries, because of widespread product mix in these industries, is not very comparable with the CMI classification) their use here could lead to misleading pictures.

¹⁹For example, according to the Population Census of 1961 [20 ; p.8], the term 'employed' means either; (i) working for pay or profit in cash or in kind including unpaid family helpers; or, ii) had a job but did not work. Using this definition, it has been estimated that Bangladesh had about 99.06 per cent of the total civilian labour force employed. Such a finding is obviously not very illuminating in view of the fact that there is a great deal of known unemployment and underemployment in the country [5;7; 25].

noted that although the distinction between complementary and competitive imports has become a standard procedure with multisectoral planners, such an approach is subject to some limitations. In a dynamic context, for example, additions of new capacities might significantly alter the criterion of complementarity, over time. What is interesting from a planners point of view, then, is a measure for the incremental (or *ex-ante*) and not the average (or *ex-post*) complementarities under each aggregate sector.

Another point worth noting is the distinction between two broad classes of complementarities arising out of the following two different sets of circumstances. Thus, some complementary imports are necessitated by the fact that they are either technologically impossible to produce at home or can be produced at inhibiting domestic cost. Frequently, such products would be use-specific and their destinations (i.e., users) will be known. An example is the superior quality cotton imported into Bangladesh which cannot be produced locally for climatic reasons and which is used up entirely by the cotton textiles sector. The other class of complementary imports occur not because there is any technological constraint to their production at home, but simply because there is a limit, over a given time period, on the rate of growth of the corresponding domestic sectors. Machinery imports into Bangladesh which go into many sectors can be cited as an example. Such imports, with clear reference to some time horizon, may be referred to as non-use specific complementarity.

Clearly, a distinction between categories of imports, such as competitive and non-competitive, with reference to time and with reference to technological constraints, should help us have a valuable insight into the nature of the various import rigidities and the foreign exchange bottleneck to the economy. Unfortunately, however, for lack of sufficient data we have to be content with the less satisfactory average *ex-post* measure of the non-competitive imports. For purposes of projection then, our exercise will involve the simplifying assumption that the incremental ratios are the same as the average ratios. This is also the case with labour employment, although the capital coefficients used here are the incremental ratios.²⁰

The fixed capital coefficients are taken from MacEwan [19]. The supply of fixed capital comes from sectors 21—27 in MacEwan.²¹ Three of

²⁰Incremental ratios are measured on the assumption that there is a proportional relationship between output expansion in a particular sector and the expansion of the stock of capital in that sector.

²¹The seven sectors are : 21. Metal products; 22. Machinery; 23. Transport Equipment; 24. Wood, cork and Furniture; 25. Construction of Residential Houses; 26. Construction of non-residential Buildings; and 27. All other construction.

them, viz., 25—27 supply construction capital, while the other four, i.e., 21—24 provide plant, machinery, transport equipment, etc. The underlying assumption in the estimation of the capital coefficients is that there is a proportional relationship between output expansion and capital requirements, which is, indeed, a considerable simplification of reality. Another serious problem pertaining to fixed capital coefficients is the assumption that there is a stable relationship between output and capacity or that there is a 'normal' capacity utilization. To some extent, however, MacEwan adjusted his coefficients for any 'abnormal' rate of capacity utilization based upon output trends for the period 1959/60—1964/65 [19, p. 41]. All the same, if for any reason, there occurs a change in the trend, that will impose a limitation on our findings.

In addition to fixed capital, it should be noted, that the requirements for the stocks of working capital (or inventories) also increase when production expands. Such increases are occasioned, for example, by natural delays in the process of transportation (to the users), and also in order that a reasonably stable supply of output can be assured (from stocks). In the context of Bangladesh, however, the use of the working capital coefficients should be treated with extra caution. The reasons are : the data base for working capital (compared to fixed capital) appears to be weaker [12, p. 234], and the requirements for such capital in the country have often been found to be independent of economic considerations [11]. In Table II, we do not show any data for working capital coefficients : however, in a later table²² we show the change in the requirements for working capital due to a change in final demand.

(c) Composition of Foreign Trade

The values of exports and imports of Bangladesh, in current prices, are shown in Table III for the years 1960/61, 1964/65, 1965/66 and 1969/70. All data, except for the imports of 1964/65, have been collected from the various publications of the Pakistan C.S.O. (central statistical office) and the Bangladesh Bureau of Statistics.²³ However, we had to regroup the figures according to the input-output sector classification. The import figures for 1964/65 have been taken straight from MacEwan [19] for reasons to be mentioned shortly.

While analysing the trade statistics of Bangladesh during the period under study, it is important to note that they contained a 'foreign component, (i.e., exports abroad and imports from abroad) and an 'inter-wing'

²²See Table IV.

²³For details, see note on sources in the table.

EXPORTS AND IMPORTS OF MANUFACTURES : BANGLADESH, 1960/61, 1964/65, 1965/66 AND 1969/70
(in million takas)

Code and Sector Description	Exports				Imports				
	1960/61	1964/65	1965/66	1969/70	1960/61	1964/65	1964/65*	1965/66	1969/70
5. Tea Manufacturing	110.7	195.2	254.4	243.3	.3	0	0	.9	1.8
7. Sugar	.9	7.6	0	.3	.6	.4	.4	13.9	22.7
8. Edible Oils	.3	.2	.3	.2	86.0	142.3	279.3	107.6	126.7
9. Tobacco	.1	.9	1.8	4.7	4.9	42.1	49.8	1.0	41.5
10. Other Food	0	0	0	0	5.4	3.8	6.7	14.2	13.9
11. Cotton Textiles	6.7	11.9	6.1	13.7	300.9	271.6	306.4	299.3	339.7
12. Jute Textiles	391.4	386.1	702.8	927.5	0	0	0	0	0
13. Other Textiles	3.8	31.4	12.0	85.8	16.0	19.8	49.0	21.2	13.2
14. Paper	44.5	91.4	83.1	111.2	10.4	61.5	81.9	34.1	46.8
15. Leather	19.0	34.9	48.1	88.2	.9	4.6	5.7	1.1	1.5
16. Rubber	0	0	0	0	10.5	13.4	24.7	12.9	29.2
17. Fertiliser	0	2.1	0	0	8.4	8.6	9.8	49.4	48.6
18. Other Chemicals	1.3	32.5	10.4	10.4	127.1	196.1	320.9	171.3	273.0
19. Cement	0	0	0	0	13.2	64.4	119.0	44.4	68.0
20. Basic Metals	0	0	.1	.3	143.8	378.4	664.2	218.0	164.9
21. Metal Products	11.0	.1	3.4	.3	32.6	54.7	95.6	59.8	76.1
22. Machinery	1.7	.4	1.4	1.5	190.5	449.8	819.8	365.8	557.4
23. Transport Equipment	5.3	.4	.2	.1	42.0	152.6	278.3	104.3	97.3
24. Wood, etc.	0	0	0	.1	.7	1.4	3.2	1.1	.8
28. Misc. Manuf.	48.3	32.2	97.6	229.3	119.3	104.8	168.2	177.3	231.7
29. Coal, Petroleum Prod. etc.	0	0	.4	0	144.6	126.3	258.5	131.2	79.9
Total	645.0	827.3	1222.1	1716.9	1258.1	2096.6	3541.4	1828.8	2234.7

Sources : For all, except 1964/65 [4,21;22]; for 1964/65 [19].

Notes : *These figures are at purchasers' prices. Other imports are at c.i.f. prices. Exports are at f.o.b. prices with the exception of inter-wing component, as explained in the text.

(a) All figures are inclusive of inter-wing trade. Inter-wing data include some foreign merchandise, which is, however, less than 2 per cent of total trade between Bangladesh and Pakistan.

(b) Exports and imports with a value of less than 0.1 million takas have been shown as zero.

(c) All values are measured at current prices.

(d) Figures have been re-grouped to conform with the input-output sector classification.

component (i.e., exports to and imports from Pakistan) and that the two components were different from each other in several respects.²⁴ Basically, the prices for goods in 'inter-wing' trade were considerably higher than their corresponding prices in 'foreign' trade. However, as a number of economists have pointed out [25], treating the two components on a combined basis would only involve a constant degree of over-valuation in trade statistics and would not involve any logical error. Moreover, such an approach is considered necessary if the objective is to have a comprehensive view of the overall trade picture.

Let us now turn to an analysis of the trade statistics. As far as the 'foreign' component is concerned, the available data for the 1960s are definitely better, in terms of reliability and coverage, as compared to the earlier years. This is one reason why we decided to confine our study here to the 1960s alone.²⁵ Prior to 1960, for example, the classification scheme was far from ideal, the coverage was often incomplete, and the non-reporting quantities were left unestimated. From July 1960, however, data were compiled on the basis of the Standard International Trade Classification (SITC original). Later, since July 1963, because of revision in SITC original, the commodity trade classification scheme in the country was revised and named as Pakistan Standard Trade Classification, Revised (PSTC R). On the whole, therefore, the data on 'foreign' trade during the sixties can be expected to be satisfactory. However, as far as the 'inter-wing' component is concerned there was no such standard classification scheme. All the same, as shown elsewhere by the author [24, Chapter VI], it is still possible to regroup the 'inter-wing' trade data so as to make them broadly comparable with the 'foreign' trade data.

At this stage, it needs to be pointed out that the input-output table used here has been formulated at purchasers' price, which means the trade entries should also be at purchasers' price. However, 'foreign' exports and imports are stated, in the official documents, at f.o.b. and c.i.f. prices, respectively. Khan and MacEwan [15] have suggested that for a general analysis of the present sort it is satisfactory to treat the f.o.b. price as the relevant purchasers' price of exports.²⁶

²⁴For details see Chapters II and IV of [24].

²⁵The study could not be extended to the 1970s because of the 'abnormal' state of the economy following the Liberation Struggle during 1971 and the concomitant problems relating to the availability and reliability of data.

²⁶'Inter-wing' exports, however, are shown at c.i.f. price (because the statistical agencies provided the data as such). The use of c.i.f. imports as a substitute for f.o.b. figures, amongst other things, involves the assumption that there is a uniform *advalorem* transport cost for all the items and that, therefore, biases occur systematically in the case of all exports to Pakistan.

The purchasers' price of imports, however, is higher than the c.i.f. price by the amount of transport cost, import duty, sales tax, trade margins, etc., within the importing country. These margins need to be added to the c.i.f. price to derive the appropriate purchasers' price. Similarly, the appropriate margins also need to be added in the case of the 'inter-wing' imports which were again recorded, by the statistical agencies, at c.i.f. price. All these would necessarily involve a great deal of labour on our part.²⁷ Fortunately, in MacEwan [19], 1964/65 import figures are available both at c.i.f. and purchasers' prices. Our calculations with both these sets of data show (to be presented shortly) that the results, in terms of resource requirements of trade, are not materially altered whether the c.i.f. or purchasers' prices are used. Hence we decided that it would be quite satisfactory, for our purposes, if we used, in respect of other years, the c.i.f. import prices alone.²⁸

IV. THE RESULTS

For the sake of convenience, the estimates, derived from the statistical exercises pertaining to the sectoral resource requirements of the industrial economy and Bangladesh's trade in manufactures, are presented in summarized form, through Tables IV-VI.²⁹ The tables are all self-explanatory. For example, Table IV shows the total (i.e., direct plus indirect) requirements of the various productive factors per unit (Taka) increase of final demand in the various sectors. It is clear that miscellaneous manufacturing sector is the most labour-intensive which is followed by wood & cork, and cotton textiles, etc. Similarly, metal products are most imported-input-intensive. The requirements for fixed capital are highest in the case of paper, while basic metals rank highest in their requirements for working capital.

Table V summarizes the factor input requirements per 100,000 takas worth of manufacturing exports and of domestic replacement of imports. In 1969/70, for example, labour requirements per 100,000 takas worth of industrial exports are estimated at 10.71 units against 10.30 for replacement of industrial imports. Similarly, the requirements for imported inputs in the same year per 100,000 takas worth of industrial exports are estimated at Tk.3080.08 against Tk.13,854.79 for replacement of imports. And so on for the other factors.

²⁷Moreover, this is also not possible for the entire period under study. To carry out his exercise, for example, MacEwan [19] drew on divergent sources, which are specific to particular years. Thus, for 1964/65 data on trade margins, he depended on Lewis and Guisinger [18] who, in turn, drew on survey findings by Pal [23]. While obviously such surveys can be undertaken in the future to supplement earlier findings, there is no way of determining what precisely happened in the past.

²⁸For the entire period under study, this would involve the implicit assumption that the trade and other margins do not significantly alter.

²⁹The details can be obtained, if required, directly from the author.

TABLE IV

**DIRECT PLUS INDIRECT REQUIREMENTS FOR PRODUCTIVE FACTORS
PER UNIT (TAKA) INCREASE OF FINAL DEMAND: BANGLADESH, 1965/66**

Sector (1)	Labour (2)		Imported Input (3)		Capital Fixed (4)		Capital (working) (5)	
5. Tea	.0000448	(17)	.0109	(20)	1.1784	(7)	.150	(14)
7. Sugar	.0000407	(18)	.0116	(19)	1.0506	(9)	.277	(3)
8. E. Oils	.0000238	(20)	.0280	(14)	.2273	(21)	.050	(20)
9. Tobacco	.0000346	(19)	.1153	(8)	.6064	(17)	.014	(21)
10. Other Food	.0000687	(15)	.0138	(17)	.5531	(19)	.200	(6)
11. Cotton Text.	.0001189	(3)	.0057	(21)	.7910	(16)	.160	(12)
12. Jute Text.	.0000848	(13)	.0123	(18)	1.2496	(5)	.234	(4)
13. Other Text.	.0001079	(6)	.0232	(15)	.5981	(18)	.068	(18)
14. Paper	.0000877	(11)	.0560	(10)	1.5237	(1)	.175	(9)
15. Leather	.0000926	(10)	.0166	(16)	.4719	(20)	.219	(5)
16. Rubber	.0001180	(4)	.1011	(9)	.7938	(14)	.052	(19)
17. Fertilizer	.0000964	(8,9)	.0488	(11,12)	1.3306	(3,4)	.118	(17)
18. Other Chem.							.119	(16)
19. Cement	.0000860	(12)	.1164	(7)	.9937	(11)	.165	(11)
20. Basic Metals	.0000507	(16)	.3940	(3)	1.4462	(2)	.446	(1)
21. Metal Prod.	.0001106	(5)	.4650	(1)	.7912	(15)	.126	(15)
22. Machinery	.0000799	(14)	.1487	(5)	.9685	(12)	.155	(13)
23. Transport Equip.	.0000989	(7)	.2611	(4)	1.0127	(10)	.347	(2)
24. Wood, etc.	.0001376	(2)	.0309	(13)	.8322	(13)	.184	(8)
28. Misc. Manuf.	.0002799	(1)	.1199	(6)	1.0838	(8)	.166	(10)
29. Coal, Petroleum Prod., etc.	.0000197	(21)	.4118	(2)	1.2412	(6)	.200	(6)

Sources : Columns 2—4 own calculations based on data given in Tables I and II; column 5 is taken from [19].

Notes : (a) Labour in number of workers. Other factors are shown in value terms (i.e., takas); at current prices.

(b) Capital coefficients refer to 1964/65.

(c) Working capital exclusive of speculative holdings.

(d) Imported input is the short term of non-competitive imported input. This also applies to other tables.

(e) Bracketed figures show, in decreasing order, the ranking of sectors according to their factor requirements per unit rise in final demand.

TABLE V

DIRECT PLUS INDIRECT FACTOR REQUIREMENTS FOR 100,000 TAKAS WORTH
OF INDUSTRIAL EXPORTS AND REPLACEMENT OF IMPORTS :
BANGLADESH, 1960-70^a

Exports	1960/61	1964/65	1965/66	1969/70
Labour	9.39	8.49	9.30	10.71
Imported Inputs	3,347.28	2,336.03	2,590.04	3,080.08
Capital (fixed)	120,117.05	119,280.43	119,874.80	115,719.66
Capital (working)	20,682.01	19,232.08	20,276.73	19,817.69
Replacement of Imports	1960/61	1964/65	1965/66	1969/70
Labour	9.79	8.60 8.27 ^b	9.91	10.30
Imported Inputs	15,891.50	18,083.37 19,233.57	16,158.62	13,854.79
Capital (fixed)	100,328.90	108,328.21 104,271.44	102,630.85	100,368.28
Capital (working)	18,833.71	21,084.80 21,359.88	19,438.81	17,401.21

Sources : Own calculations based on data given in Tables I—III.

Notes : ^aLabour is measured in terms of number of workers (average daily employment) while other factors are given in value terms, i.e., takas at current price.

^bFigures in *italics* at purchasers' prices; other columns as explained in the text.

TABLE VI

FACTOR REQUIREMENT RATIOS

(Requirements for Exports ÷ Requirements for Import Replacement)

	1960/61	1964/65	1965/66	1969/70
Labour	0.959	0.987 1.027	0.938	1.040
Imported Inputs	0.211	0.129 0.121	0.160	0.222
Capital (fixed)	1.197	1.101 1.144	1.168	1.153
Capital (working)	1.098	0.912 0.900	1.043	1.139

Source : Same as Table V.

Note : Figures in *italics* show the ratios with estimates based on purchasers' price import data as the denominators.

Again, Table VI shows the factor requirement ratios for industrial exports of Bangladesh as compared to industrial import replacement for a given increase in final demand. It can be easily seen that the ratio for labour in 1969/70 turns out to be 1.040, for imported inputs it is 0.222, and so on.

It should be noted that the factor requirements shown for 1965/66 refer to the actual trade structure and input coefficients for that year. Those for 1960/61, 1964/65, and 1969/70 refer to the actual trade structures in those years, but with input coefficients the same as in 1965/66.³⁰ The changes in factor use during the years covered, thus, refer entirely to changes in the structure of trade with constant input coefficients.

V. INTERPRETATION OF RESULTS

Contrary to expectations, the industrial exports and import substitutes of Bangladesh do not differ markedly in their implications for labour requirements, and the former embody somewhat more capital per unit of output as compared to the latter.

For instance, the export/import replacement ratios for labour have remained closely near one, which have been shown in Table VI. On both sides, however, because of changes in trade composition, there have occurred some increases, since the mid-sixties,³¹ in labour requirements; the increase being a little faster in the case of exports as compared to import replacement. Thus, labour needed per 100,000 takas worth of industrial exports and import replacement, which were respectively, 9.39 and 9.79 units (of average daily employment) increased by 1969/70 to 10.71 and 10.30 units respectively. These had the effect of reversing the initial labour requirement ratios of the two activities (i.e., industrial export/import replacement), so that by the end of the sixties, in contrast to the earlier years, exports needed a marginally greater amount of labour as compared to import replacement per unit increase in final demand. Hence, the labour requirement ratio for 1969/70 comes closer to our hypothesis that export expansion, in general, should generate more employment in a country like Bangladesh as compared to import replacement, although the results are by no means conclusive for the entire period.³² Such a finding obviously needs further explanation which will be presented shortly.

³⁰The capital coefficients, however, refer to 1964/65.

³¹During the early sixties, the absolute labour requirements in both export and import replacement activities appear to have declined (for a given increase in final demand).

³²Moreover, it is abundantly clear that even for 1969/70 the 'labour requirement for exports was only fractionally higher than the corresponding requirement in import substitutes so that even for that year we have really to reserve our judgement about the acceptability or to otherwise of the hypothesis.

Before that, let us turn our attention briefly to the results relating to capital requirements. With regard to fixed capital, it is obvious that the requirements of exports relative to import replacements remained higher throughout, although, there occurred some narrowing down of the differential by the end of the sixties. Thus, the amount of fixed capital needed to replace 100,000 takas worth of imports could produce about Tk. 83,526 and Tk. 86,734 worth of exports in 1960/61 and 1969/70 respectively. Between these two years, i.e., 1960/61 and 1969/70, it should be noted that the requirements for working capital declined by a somewhat larger margin in the case of import substitution as compared to export expansion.³³ Accordingly, the amount of working capital needed to replace 100,000 takas worth of imports, which could produce 91,063 takas worth of exports in 1960/61, could produce export goods worth only Tk. 87,806 in 1969/70.

Combining the working and fixed capital requirements of the EP and IS policies, the following income implications may be indicated. The total capital (working and fixed) needed to replace 100,000 takas worth of imports could produce about only 84,633 takas worth of exports in 1960/61. In 1969/70, the same could produce 86,891 takas worth of exports; or, in other words, on a combined basis there occurred some fall in the relative capital requirements of exports as compared to import substitutes. All the same, it is clear that during the period under review, the capital cost of export expansion in Bangladesh remained higher relative to an equivalent import substitution.

Since, however, the economy is characterized by an abundance of (unskilled) labour and scarcity of capital, the above results are surprising, about which a few explanatory words are now in order. The basic explanation can possibly be provided with reference to the general pattern of industrial growth (industries which later turned to exports) in Bangladesh which followed highly capital intensive lines [10; 12]. Khan [12] has, for example, shown in an inter-country comparison of capital intensities (defined as value of fixed assets per man-year of employment), that the (full capacity) capital-labour ratios in the manufacturing industries of Bangladesh are significantly higher (with the exception of basic metals) than that in Japan and sometimes as high as that in the U.S.A.

The reasons for such high capital intensity in Bangladesh can be understood with reference to the following. First, the relative factor prices that prevailed in

³³In 1964/65, it should be noted, the working capital requirement of exports was somewhat lower as compared to import substitutes. Since, however, data on working capital are somewhat suspect, we did not consider it worthwhile to probe deeper into its implications.

the market and which confronted the decision-makers were often distorted. The rates of interest were kept artificially low, and further, tax concessions on investment expenditure and an overvalued exchange rate cheapened capital, while the price of labour, set at a higher level than its efficiency price [12] encouraged the use of labour saving technology. Secondly, the *ex-ante* technological possibilities which underline the extent of the elasticity of factor substitution were severely restricted in the case of Bangladesh due to the operation of one or more of the following factors, viz., (i) foreign aid policies of the industrial countries which frequently restrict the use of aid to the capital components of projects which, of course, encourage the maximization of this component; (ii) the industrial country monopoly on the supply of capital goods, which results in a growing labour saving bias to industrial techniques;³⁴ (iii) shortage of supervisory labour complementary with unskilled and semi-skilled labour;³⁵ and (iv) a distribution of income which biases the structure of demand towards capital and skill intensive elite-goods.³⁶ A third group of reasons as to why the observed capital intensity in Bangladesh appears so high is the widespread prevalence of excess capacity in the manufacturing industries.³⁷ Excess capacity may have been caused by an inadequate supply of inputs (including, maintenance inputs) or even by lack of sufficient demand for the products. But the primary factors which were responsible, in the first place, for the 'creation' of the excess capacities are probably to be traced to government monetary, industrial and commercial policies which underpriced capital, encouraged building up of excess (i.e., in relation to demand at a given time period) capacity to insure against future difficulties in obtaining licences or to stop the possibility of new future entry into the industry, and so on.

Apart from the generally high level of capital intensity in the Bangladesh manufacturing industries, there is a special reason why it should be more so in the case of the export goods. The manufacturing export trade of the country has been found to be dominated by large firms [9], whose capital intensities have been estimated

³⁴This factor may be transmitted through tied aid as well as through direct private foreign investment..

³⁵This explanation is provided by the Capital-Skill Complementarity (c.s.c.) hypothesis which states that the elasticity of substitution of capital for unskilled labour is greater than the elasticity of substitution of capital for skilled labour. Therefore, faced with a shortage of skilled labour, there will be a strong tendency on the part of the entrepreneurs to substitute labour by capital [6].

³⁶All these various factors are well elaborated in [29].

³⁷The extent of industrial capacity utilized in Bangladesh has been estimated at about 67.6 per cent, on a one-shift basis, for 1965 [5]. On a two and a half shift basis. Winston estimated that the extent of industrial capacity utilized in Pakistan was about 33 per cent in 1965/66 [30]. On similar basis, the extent of capacity utilization in Bangladesh is unlikely to be significantly different from that in Pakistan.

to be systematically higher than those of the smaller firms [12, p. 249]. A number of factors, including differences in product-mix and degree of complication of technology, might have contributed to the relatively lower capital intensity of the smaller firms as compared to the larger firms. Thus it has been argued that the small-scale enterprises had lower access to capital (bank credit) as well as industrial and commercial licences; as a consequence, they probably had to face a more rational relative factor price as compared to the large-scale establishments [12].³⁸

So far we have confined our interpretation to labour and capital requirements only. Let us now turn to a discussion of the other factor, namely, imported inputs. Our estimates in this respect show that the export industries, in general, needed much less of imported inputs as compared to import replacement for a given increase in final demand. In other words, if foreign exchange is regarded as a constraint on growth, then the implications of an EP and IS policy with regard to income creation is clear. Imported inputs needed to replace 100,000 takas worth of imports in 1960/61, for example, could have produced 474,759 takas worth of exports.³⁹ In 1969/70, the same would produce somewhat less, but even then a significantly high amount, i.e., Tk. 449,819 worth of exports.

VI. SUMMARY AND CONCLUDING REMARKS

To sum up, the following points may be mentioned here.

First, as far as employment potential is concerned, the EP and IS strategies stand virtually on the same footing.⁴⁰

Second, with regard to income implications, however, the results will depend on what we consider to be the scarce productive factors. For example, if capital⁴¹ is assumed to be the only constraint in the development process, with no shortage of foreign exchange, then the IS policy would be superior to the EP policy. On the other hand, if foreign exchange is treated as the only constraint with no shortage of capital, then the EP policy would do significantly better. When, however both capital and foreign exchange are considered to be scarce, as is the case in the context of Bangladesh, the EP policy is expected to

³⁸It is also likely that foreign aid was comparatively more heavily concentrated in large firms, which also probably had the effect of raising their capital intensity relative to that of the smaller-scale import-competing industries.

³⁹Based on the implicit assumption that domestic capital (and other factors) is no constraint in the process of growth.

⁴⁰When, however, skill differentials are taken into account, the EP policy becomes somewhat superior in respect of labour employment. See [24, chapter IX].

⁴¹Capital refers here to fixed and working capital combined.

retain a significant advantage over the IS policy in so far as the income potential is concerned. Thus, in 1960/61, capital and foreign exchange needed to replace 100,000 takas worth of imports could produce 279,969 takas worth of exports.⁴² In 1969/70, the same capital and foreign exchange could produce about 268,355 takas worth of export goods.

Finally, between 1960 and 1970, there did not occur any significant change in the commodity composition of either industrial exports or industrial import substitutes in a way as to have by any perceptible impact on their respective demands for labour relative to the various scarce productive factors. This stability in factor input requirements suggests that neither export expansion nor import substitution were guided, during the above period, by any special attention to the desirability of creating employment opportunities or maximizing the output from a given use of the country's scarce resources.

All the same, before we conclude, it is important to point to at least the following two caveats in the light of which our above findings and their interpretations should be read.⁴³ First, the adoption of the input-output analysis imposes a number of well-known limitations including, for example, ignoring the problem of the choice of techniques, in addition to involving the assumptions that the circumstances relating to factor prices, technical progress, etc. which determine the input coefficients of the given technical blueprint remain unaffected during the period under study. Secondly, our level of aggregation for commodity classification might have affected a crucial part of the analysis, viz., the estimates of factor proportions embodied in Bangladesh's manufactures. It is quite conceivable that the factor intensities of a given subsector may differ from that of the sector's average.

Be that as it may, it is to be noted that if 'true' comparative advantage, in the static sense, were allowed to operate, Bangladesh might have very few exports anyway. A recent programming exercise [14, p. 125] has shown that of the twenty-two tradeable goods (sectors), only three or four (e.g., jute, leather, and tea) could profitably be placed in the export basket of the country. Hence, it follows, as is the case, that many exports depend on subsidies and other incentive measures to compete in the world market. This necessarily weakens expectations of any systematic connection between industrial exports and factor availabilities. However, this should not be viewed as a serious shortcoming. Our objective strictly is not an empirical verification of the factor proportions

⁴²That is, on the assumption that the foreign exchange constraint on growth is separate from the domestic capital constraint.

⁴³Which are in addition to the fact that the extent of employment that trade in manufactures can generate is only marginal when viewed against the side of Bangladesh's total available labour force, an overwhelming proportion of which is absorbed in agricultural activities. See Section III.

theory, but a determination of the output and employment implications of trade. Moreover, comparative advantage is essentially a dynamic concept and is, therefore, subject to continual review. At any point in time it may simply reflect only the past colonial division of labour, and may not at all represent the true potential of a particular economy.

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Reasons for Idle Capital : The Case of Bangladesh Manufacturing

by

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This paper makes an attempt to understand the causes of low capital utilization in the manufacturing industries of Bangladesh. After providing a short summary of the theories which have been advanced to explain the idleness of capital, the empirical implications of a major theoretical work by Marris is brought out in the form of some estimating equations. Of the variables included in these equations only firm size appears to have a significant impact on utilization in the case of Bangladesh. This led to a search for alternative explanations of the phenomenon of low capital utilization. Supply bottlenecks created by the shortage of key inputs like raw materials and spare parts (especially imported ones), skilled manpower, etc. are found to be quite important. The availability of raw materials and spare parts (both domestic and imported) explain nearly 77 per cent of the variation in capital utilization. It is argued that the policy of import licensing, project-bias of foreign aid, overvaluation of the currency giving rise to the practice of overinvoicing have encouraged the creation of additional idle capacity. Finally, the evidence of any relationship between utilization and the use to which the product of a particular industry is put is also weak.

I. INTRODUCTION

In view of the fact that capital accumulation is taken to be an important pre-requisite for the development of LDCs, a paradox of great significance is the low level of utilization of the capital stock in such countries, although most of them suffer from a critical scarcity of capital.¹ The paradox is significant because an increase in utilization of capital stock would increase the levels and rates of growth of both income and employment [31; 35; 36; 38]. It has been demonstrated that once the utilization of capital is taken as an economic variable, the equivalence of capital stock and capital services is broken, and this variable must be incorporated into the familiar Harrod-Domar growth model. A change in utilization will also lead to a change in the rate of growth [31; 35]. It has also

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¹In recent years, extensive work has been done in this area. For some evidences of low capital utilization in LDCs, see [12; 13; 15; 31].

been shown that the amount of employment generated by a unit of capital stock will vary in response to changes in utilization [38]. It is clear that a plant operating for a longer period of time will use more man-hours on a given capital stock than the same plant operating for a shorter period. And if a set of production 'crew' has to be replaced by another after a certain number of hours, an increase in utilization will clearly lead to an increase in the number of labourers employed with a given amount of capital stock. In view of the major significance of the phenomenon of low capital utilization in LDCs, an investigation into the factors responsible for it and feasible utilisation policies can be quite useful. The present paper makes an attempt to understand the causes of low capital utilization in the manufacturing industries of Bangladesh.

The paper is organized as follows. Section II provides a short summary of the theories which have been advanced to explain the idleness of capital. The empirical implications of a major theoretical work has been brought out in the form of some estimating equations in Section III. The results of estimating these equations have also been described in that section. The role of input supply in explaining the level of capital utilization has been examined in Section IV. Section V explores the relationship between product end-use and the level of utilization. Section VI shows that the same set of variables can be said to be responsible for the low level of utilization in the post-liberation period. The important results of the paper are summarized and some conclusions are presented in Section VII.

II. THE THEORY

The growing literature on capital utilization suggests a number of reasons for idleness of capital, a list of which may be quite long. The various explanations can, however, be classified into two broad groups. First, a certain amount of idleness may be built into the plant, *ex-ante*, by the rational entrepreneur who can anticipate future events. The second explanation of idle capital is in terms of un-foreseen events and misfortunes that may occur after a plant is built.²

Intended Idle Capital

The rational *ex-ante* decision by the entrepreneurs to leave the capital stock idle some of the time may be explained by a variety of factors like anticipated dynamic, unanticipated stochastic, or rhythmic changes in product demand which make it profitable to do so [35].

²For a neat taxonomy of the various reasons for idle capital, the reader is referred to [32]. See, also [35].

The other kind of explanation for the intended idleness of capital is based on anticipated supply characteristics. Although an increase in the level of capital utilization reduces capital costs, it has the effect of increasing some other costs, thus offsetting the potential savings in capital costs with greater use. These higher costs may arise from increasing depreciation or rising prices of other inputs. The depreciation models hold that physical deterioration, and hence depreciation of the capital stock increases so sharply with its continuous use that it is optimal to leave the plant idle for a part of the time to avoid these high and increasing depreciation rates.³ These models, however, are not based on empirical evidence of such alarming rate of deterioration. In contrast, it would be more reasonable to argue that the life of a machinery would remain the same whether its use is spread over a longer period of time or concentrated into a short span of time. In fact, in some cases (e.g., chemical processing) the continuous use of the equipment actually reduces wear.

The other approach which regards rhythmic variations in input prices as the source of rising costs associated with higher utilization is based largely on Marris' pioneering study [16] of U.K. industries in the 1950's. His analysis is based on the simple but important fact that night is a non-preferred time for most people and hence they have to be paid a premium wage or salary if they are required to work at that time. Hence, higher utilization may be expensive because it involves night work. Since Marris' work has led to important developments in the literature of capital utilization and since his analysis brings out a number of factors which have been seen to influence capital utilization, we shall devote some attention to it.⁴

Marris' is essentially a profit maximization model in which people's preferences form an important element in the cost. In order to bring out the important elements in the model we have to start by assuming that there are different techniques as well as different rates of utilization (such as, single shift, double-day-shift, three-shift) associated with a particular production process. Each combination of a technique of production and a rate of utilization will be called a system of operation. And each system will be associated with a rate of profit.

Now, we consider a firm operating in a low-wage economy where the system involving the most labour-intensive technique and the highest level of utilization gives the maximum profit. If we introduce an imaginary variation in the wage

³The first formalized model of this sort can be found in [26].

⁴Although this analysis was not meant for a less developed economy, it has been demonstrated that the factors emphasized in it have important implications for the low level of utilization in LDCs as well. See [31].

rate the system of maximum profit will also change. For example, if the wage rate rises substantially, the original combination of technique and utilization will no longer yield maximum profits. How will the firm react to these changed circumstances? There are two alternatives open to him. First, it can reduce the level of utilization. This will reduce the number of workers in the higher-wage shift and hence, the average wage rate. Second, the firm can adopt a more mechanised technique thereby increasing labour productivity. Both of these alternatives, however, involve certain costs. The cost of the first alternative is the lost output that results from a reduction in the level of utilization and the 'waste' of the capital involved in letting it sit idle more of the time. The cost of the second alternative is simply the increased cost of the more mechanised technique needed to achieve the necessary rise in labour productivity.

Which of these two alternatives will be the more profitable from the firm's point of view will depend on the costs associated with them which in turn will depend on preferences (determining the wage premium for night work—'the shift differential') and the technical characteristics of the production function. These two factors can be conveniently summarized in two measures called the 'elasticity of utilization' and the 'elasticity of mechanization'.

The elasticity of utilization has been defined as the proportionate change in utilization relative to the proportionate change in utilization differential between the two systems of operation. The elasticity of mechanization is defined as the proportionate change in productivity relative to the proportionate change in capital per man.

If the elasticity of utilization is high a good deal of output would have to be lost before the average wage was much reduced through reduced utilization. Thus given the set of technological alternatives facing an industry, a high elasticity of utilization makes reduction of utilization an unattractive way to adjust to an increase in the wage rate. If, on the other hand, the elasticity of utilization were low, a given adjustment in average wage could be had with relatively little loss of output. It is, therefore, more likely that a given increase in basic wage will make shift work unprofitable if the elasticity of utilization were low than when it was high.

The cost of the second alternative will depend on the elasticity of mechanization. The higher the value of this elasticity, the lower the cost of achieving a given adjustment in average wage through increasing productivity. Clearly, given an elasticity of utilization, the higher is the elasticity of mechanization, the more likely is the adjustment to higher wage rates to take the form of increasing capital intensity and the less likely that it will take the form of reduced utilization. It has,

however, been pointed out by Marris that the level of utilization and the level of capital intensity that will be optimal with a given wage rate will depend on both elasticities.

In addition to these two elasticities, Marris' analysis pointed out a second set of technological characteristics that influences the rate of capital utilization through economies of scale. According to this analysis, if the maximum permitted output is very large, the other conditions are suitable, maximum utilization can be achieved without any difficulty. If, however, any restraint on the scale of output (e.g., due to limited markets) reduces the maximum permitted output to a very low level, the rate of capital utilization will also be depressed. This may happen because of the indivisibilities of the equipments relative to the size of the market, for if the maximum permitted output falls below the output capacity of a single unit of equipment, the entrepreneur may have no other alternative than to install the equipment and leave it idle for a part of the time. Apart from the indivisibilities of equipment, the scale of output may influence utilization through the necessity of maintaining internal balance of production flows between various lumpy pieces of equipment within the plant. This problem arises when the plant consists of a number of different types of equipment with different maximum hourly rate of output per unit. If in such a case, total final output is restrained, some units of equipment may remain underutilized.

Scale of output may also affect utilization through the indivisibility of management. Shift-work creates considerable additional burdens on management, whose weight increases proportionately as the size of the firm reduces. In every small firms, where the Managing Director is also effectively the works manager, the cost of shift-work may be too high to render it unprofitable.

Since Marris' work, important theoretical developments, making significant contribution to our understanding of the use and idleness of capital, have taken place. Marris' analysis has been integrated with orthodox production theory in a series of increasingly formal production models showing the determinants of the optimal idleness of the capital stock.⁵ Another contribution of these developments is that the basic day-night wage-rhythm has been generalized to include rhythmic (or seasonal) variations in other input prices (e.g., electricity, or agriculture-based raw materials) which affect production costs in a regular and foreseeable manner and help to determine the optimal level of capital utilization in a number of industries (specially, agriculture-based).

⁵They include both discrete-time optimal shift-work, model as well as continuous time model that incorporates all the orthodox propositions of production optimality and uses a fully specified pure-flow production analysis. See [3; 8; 33; 34; 38].

According to this analysis, the optimal level of capital utilization that will be planned by the entrepreneur will depend upon

- i) the cost of capital relative to labour (positively);
- ii) the amplitude of the input price rhythm (negatively);
- iii) the elasticity of factor service substitution (positively) ; and
- iv) the capital intensity of the production process (positively).

Unintended Idleness of Capital

So long we have been concentrating on the idleness of capital which is planned, *ex-ante*. But unanticipated events and misfortunes may occur after a plant is built and prevent the entrepreneur from utilizing his capital stock fully. These events may come both from the demand and the supply side. When there is a product-demand misfortune (of the Keynesian type), it may be profitable for the entrepreneur to reduce output by leaving the capital stock idle for a part of the time. Explanations on the supply side concentrate on the bottleneck created by the shortage of critical inputs like raw materials, skilled manpower, etc. While the possibility of product demand misfortune cannot be ruled out, supply bottlenecks may be more important for explaining the low level of capital utilization in LDCs.⁶

III. ESTIMATING EQUATIONS AND THE RESULTS

Keeping in mind the problems of data availability, we can bring out several factors suggested by the above analysis, and examine whether they are related to the level of utilization in the manufacturing industries of Bangladesh.⁷

The factors which seem to play crucial role in Marris' analysis are the elasticities of utilization and of mechanization and the size of the firm. While the size of firm can be represented conveniently by the value of production per unit of establishment, it is difficult to get measures of the two elasticities. It, however, appears that the degree of capital intensity (measured, say, by capital-value added ratios) can be used as a surrogate for the elasticity of mechanization, because one would tend to find that those firms with higher capital-value added ratios were also those that had higher elasticity of mechanization in the

⁶For several examples of how a shortage of critical inputs like raw materials, spare parts, skilled manpower, etc. can force the entrepreneurs to leave capital idle, see [7; 10; 11; 28].

⁷This section deals with the empirical implications of Marris' theory. The role of other factors will be examined in subsequent sections.

past. Hence, given the elasticity of utilization the rate of capital utilization and capital-value added ratios are likely to be positively related.⁸

Another factor of significant importance implied by Marris' analysis is labour productivity. In comparing different industries each having a different set of technological alternatives that define elasticities of mechanization and of utilization we would expect to find the highest levels of utilization in those industries with lowest wages and labour productivities. In Marris' model, those industries found to be operating at high levels of utilization are those with low wage and low productivity of labour. They behave as if they were early in the sequence of adjustment to increasing real wage, from the starting point of low wage, low productivity, and high utilization.

On the basis of the above analysis, we postulated the following relationship between the level of utilization (U) on the one hand, and the size of firm (S), capital-value added ratio (K/V), and labour productivity (L) on the other.

$$U = a + b_1 S + b_2 (K/V) + b_3 L \quad (1)$$

Marris' theory, however, predicts that the relationship between utilization and firm-size should be non-linear. Accordingly, we shall also test a non-linear relationship of the type

$$U = a + b_1 S + b_1 S^2 \quad (2)$$

Since Marris also suggested that international boundaries or any other factors limiting the size of the market will tend to depress optimum rates of utilization, we shall also postulate a relationship between capital utilization, and two variables used to represent the influence of the size of the market. These two variables are: (i) imports as a proportion of total supply (M), and (ii) exports as a proportion of domestic production (E). In order to test the significance of these variables we shall introduce each of them separately into equation (1) and examine the relationships.

$$U = a + b_1 S + b_2 (K/V) + b_3 L + b_4 M \quad (3)$$

$$U = a + b_1 S + b_2 (K/V) + b_3 L + b_5 E \quad (4)$$

⁸It should, however, be noted that a negative relationship is also not impossible. Since the incentive to utilize depends on both elasticities, an industry with a low elasticity of mechanization (or a low capital-value added ratio, if we use the surrogate) may nevertheless show a high rate of utilization if it is characterized by a high elasticity of utilization. Further, it has been argued by Wilmore and Acheson [29], that restrictions on the original situation of the firms and on the responses to the change in wages are necessary if the positive correlation between the rate of utilization and capital-value added ratio is to be realised in the real world. They, however, agree that organization theory also suggests a positive correlation between the level of utilization and capital-value added ratio.

We shall also try one specification which incorporates both M and E along with the other variables, i.e.,

$$U = a + b_1 S + b_2 (K/V) + b_3 L + b_4 M + b_5 E \quad (5)$$

It is also suggested by some studies that the nature of the market structure also plays an important part in determining the level of capital utilization.⁹ In order to examine the importance of this variable in the case of Bangladesh, we used the number of establishments in an industry (N) as an indicator of the market structure and incorporated it into equation (1). Thus we got

$$U = a + b_1 S + b_2 (K/V) + b_3 L + b_4 N \quad (6)$$

Although some other variables are suggested by our discussion in Section II, problem of data availability precludes their inclusion in our tests. For example, the influence of the relative price of labour and capital could be best examined by a time series data or a cross-section analysis based on international data. Since we are concentrating on a cross-section of industries within a single country, it did not seem worthwhile to try to test its implications. Similarly, we ignored other variables like the amplitude of the input price rhythm, and the elasticity of factor service substitution because of the lack of empirical knowledge about the magnitude of these parameters.

The Results

Data required for our purpose come from 15 manufacturing industries of Bangladesh.¹⁰ All the equations described above were estimated by the ordinary least squares method. The results of the regression analysis are shown in Table I. We must, however, warn the reader that the results should be interpreted with caution because this type of analysis is almost always beset with statistical problems. Further, as Marris himself points out, "... a negative result will not necessarily provide certain negation of the hypothesis tested; the variable we are able to observe will rarely be exactly those defined in the hypothesis, and failure may be due to inadequacies of the estimates substituted. ... Conversely, if we do not obtain negative results we have not proved our theory, we have merely failed to disprove it" [16]. With these reservations in mind, we can now have a look at our results.

The results, however, are not very encouraging. The only variables which appear to be significantly related to the level of utilization are firm size and

⁹How imperfections in competition influence utilization has been analysed in some details in Merhav [18]. Although the implications of this analysis are not clear, it seems to suggest that in LDCs, industries with fewer establishments should experience higher levels of utilization compared to industries with a large number of firms.

¹⁰Appendix I contains a description of the data.

imports expressed as a proportion of total supply. The positive sign associated with the coefficient of firm size is consistent with our hypothesis as well as other evidence. Economies of scale undoubtedly play a major part in the significantly positive correlation between average firm size and capital utilization. It is, however, difficult to specify what sort of scale economies operate—whether it is simple lumpiness of plant relative to demand or the more subtle phenomenon suggested above of equipment scale relative to product flows within the plant or management scale.

Some other explanations for the positive correlation between size and utilization may be suggested. First, if high rates of utilization indicate efficiency, then efficient firms would probably grow larger than the inefficient firms. Second, if political power is greater for larger firms—influencing political-economic decisions such as licensing of imports (and if capacity use were constrained by their shortage)—then larger firms would operate at higher levels of utilization. This second may have been quite an important factor behind the positive correlation between size and utilization in an economy like that of Bangladesh. Third, the use of 'informal' labour may be greater in the smaller firms. And since such labourers are likely to be more reluctant to do night-shift work, the smaller firms may be compelled to leave their plant idle during the night.

Another interesting fact is that the non-linear relationship between firm size and capital utilization does not seem to hold good in the case of Bangladesh. In the estimate of equation (2) the coefficient of S^2 does not appear to be significantly different from zero. In fact, in all other specifications, a linear relationship was postulated and the coefficient of S appeared to be consistently significant.

The other variable which is seen to be significantly related to capital utilization is imports expressed as a percentage of total supply. But in contrast with the available evidence, the sign associated with the coefficient of M is positive.¹¹

It is, however, not very difficult to furnish a reasonable explanation for this. In an import-substitution industrialization programme only those goods are imported which are on very high demand and where acute shortages persist within the domestic economy. Hence our variable M (and the way it is measured) should reflect demand and the availability of a secure market within the domestic economy, rather than a competing source of supply and hence a reduction in the size of the market. Viewed in this way, it may not be surprising to find higher utilization to be associated with greater imports as a percentage of total supply.

¹¹Winston [31] for example, found in the case of West Pakistan, a negative relationship between M and U . He argued that since this country followed an import-substitution industrialization policy, it has biased investment towards those industries with significant competing imports, and this would have led in time to more capacity in those industries.

TABLE I
RESULTS OF THE REGRESSION ANALYSIS

Equa- tion No.	Constant	b ₁	b ₂	b ₃	b ₄	b ₅	b ₆	b ₇	R ²	F	D.W.
1.	41.9623 (9.4107)	0.1021** (0.0414)	1.3186 (1.2881)	(0.2469 (0.4069)					0.3967	2.41	2.03
2.	38.9383 (10.2097)	0.1904+ (0.1306)						0.0002 (0.0002)	0.3663	3.47	2.48
3.	28.8351 (10.0602)	0.1244*** (0.0352)	1.3462 (1.0587)	-0.1794 (0.3355)	0.5357** (0.2137)				0.6295	4.25**	1.82
4.	43.2076 (10.6626)	0.1000*** (0.0438)	1.3615 (1.3524)	-0.2383 (0.4258)		0.0523 (0.1737)			0.4021	1.68	1.96
5.	14.3365 (12.6780)	0.1419*** (0.0359)	1.1727 (1.0200)	-0.1904 (0.3209)	0.7402** (0.2516)	0.2241+ (0.1610)			0.6952	4.10**	2.15
6.	47.9348 (16.1815)	0.0927 (0.0476)	0.9949 (1.5086)	-0.2265 (0.4246)			-0.1057 (0.2284)		0.4093	1.73	2.03

***Significant at 99 % level

**Significant at 95 % level

*Significant at 90 % level

+Significant at 80 % level

Figures within the parentheses are the standard errors of the coefficients.

The failure to get significant coefficients for all the other variables (specially for K/V and L) prompted us to look for multicollinearity in our data. A look at the correlation matrix (shown in Table II) may be helpful for the purpose. It is seen that except N , none of the other variables seem to have a particularly strong correlation with S . In the case of N also, the simple coefficient of determination (r^2) between N and S is smaller than the coefficient of multiple determination (R^2) in equation (6). The other cases where two independent variables are seen to be fairly strongly associated are (i) between K/V and L , (ii) between K/V and N , and (iii) between M and E . In all these cases, however, the relevant r^2 is smaller than R^2 . Although no definite conclusion can be drawn from this comparison alone, we can argue on the basis of Klein's criterion,¹² that the problem of multicollinearity is not very damaging here.

A look at the values of R^2 suggests that the variables selected for testing cannot explain more than 53 per cent of the variation in capital utilization in the case of Bangladesh when R^2 is corrected for degrees of freedom. This is not surprising in view of the fact that we have only tested the influence of some of the purely economic variables suggested by the theory of capital utilization, and they are not expected to explain much of the variation in capital utilization in an LDC like Bangladesh. In fact, the growing empirical evidence suggests a whole lot of other variables (some connected with the pattern of industrialization, some resulting from political and sociological factors and some from underdevelopment itself) which may be of importance in explaining the low level of capital utilization in countries like Bangladesh.

TABLE II
CORRELATION MATRIX OF INDEPENDENT VARIABLES

K/V	1.0000	0.1013	0.5036	0.1428	-0.0839	-0.4724
S	0.1013	1.0000	0.2631	-0.1306	-0.2936	-0.4129
L	0.5036	0.2631	1.0000	0.0955	-0.1654	-0.2464
E	0.1428	-0.1306	0.0955	1.0000	-0.5207	0.3854
M	-0.0839	-0.2836	-0.1654	-0.5207	1.0000	-0.2058
N	-0.4724	-0.4129	-0.2464	0.3854	-0.2058	1.0000

IV. INPUT SUPPLY AND CAPITAL UTILIZATION

Of the other factors influencing capital utilization, supply bottlenecks created by the shortage of key inputs like raw materials and spare parts, skilled

¹²See Klein [14].

manpower, etc. may be the most important. Let us first consider the result of the dependence on and the shortage of imported raw materials. It is suggested that the dependence on imported raw materials may restrict full utilization either (a) directly as industrial capacity is extended beyond a country's ability to provide needed raw materials from its foreign exchange resources, or (b) indirectly in countries where raw material import licences depend largely upon installed capacity so that unused capacity is built in order to obtain valuable imports. It may, therefore, be of interest to look at the factors which may affect utilization through the dependence on imported raw materials.

Import Policy and Import Licensing

In the face of a foreign exchange crisis, the administration in LDCs often react by imposing direct restrictions on imports primarily through a system of rigid and detailed system of import licensing. Precisely this has been the experience of Bangladesh during the days of her partnership with Pakistan as well as after liberation. Examination of the system during the earlier period reveals some interesting features. In licensing maintenance imports for the private sector, the administrators, as in every licensing system used to pay major attention to 'historic claims' and to registered or licensed capacity. Each firm licensed in the past was entitled to a fair allocation of scarce inputs. Any expansion of existing or creation of new capacity establishes an additional entitlement.¹³ Since imports at the current rate of exchange had a high scarcity value, there were strong incentives to expand capacity to qualify for industrial material import licences.¹⁴

There is another interesting way in which the import licensing system affected the level of utilization. In determining the essentiality of imports, it is reported, the licensing authorities ranked capital goods as relatively more important than intermediate and consumer goods. Thus the expansion of capacity proceeded at a faster rate than the availability of raw materials, causing a low rate of capital utilization. It is reported that raw materials were, in principle, licensed on the basis of a single-shift capacity and there is evidence that many firms were not able to operate steadily even at one-shift-capacity. The strength of capital-bias in the licensing system can be seen from Tables III and IV, where we have assembled information on the relative shares of broad commodity groups in

¹³For a good analytical description of the working of the licensing system in Pakistan (of which Bangladesh was a part till 1971), the reader is referred to [19].

¹⁴It would have been interesting to look at the value of capital investment and expansion of capacity in terms of entitlement in each individual industry. Unfortunately, a lack of information about the entitlement to scarce inputs for various industries precludes us from doing it.

import licences in various years. Table III suggests that between 1953/54 and 1958/59 the relative share of capital goods and raw materials for capital goods in total licensing increased substantially while that of raw materials for consumer goods registered a remarkable decline. The same experience is repeated by commercial licensing (Table IV). Here the relative share of capital goods increased by as much as 20.8 per cent between 1955 and 1963, while that of raw materials actually declined over the same period. Although the share of raw materials in licences issued under export bonus scheme showed some increase between 1959 and 1963, this was only half the increase in the share of capital goods over the same period (see Table V).

TABLE III

**RELATIVE SHARES OF BROAD COMMODITY GROUPS IN THE IMPORT LICENCES
(TOTAL) ISSUED BY THE CCI & E, 1953/54—1958/59**

Import Category	1953/54 Percentage of Total Licensing	1958/59 Percentage of Total Licensing	Net Percentage Difference
C _o	18.5	15.0	— 3.5
RC _o	24.9	13.0	—11.9
RC _c	28.9	37.2	+ 8.3
C _a	27.7	34.8	+ 7.1

Note : C_o=consumer goods, RC_o=raw materials for consumer goods, RC_a=raw materials for capital goods, and C_a=capital goods.

Source : [20].

TABLE IV

**PERCENTAGE CHANGES IN THE COMPOSITION OF IMPORT LICENCES ISSUED
UNDER COMMERCIAL LICENSING, 1955—1963**

Import Category	1955 Percentage of Total Commercial Licensing	1963 Percentage of Total Commercial Licensing	Net Change (in %)
C _o	31.9	15.5	—16.4
RC _o	18.6	11.0	— 7.5
RC _a	35.2	40.3	+ 5.2
C _a	14.3	34.1	+20.8

Source : [20].

TABLE V

**CHANGES IN THE COMPOSITIONS OF LICENCES ISSUED UNDER THE EXPORT
BONUS SCHEME, 1959—1963**

Import Category	1955 Percentage of Total Licensing under E.B.S.	1963 Percentage of Total Licensing under E.B.S.	Net Change (in %)
C _o	24.3	14.1	—10.1
RC _o	27.8	31.0	+ 3.2
RC _a	8.1	9.1	+ 1.0
C _a	39.8	45.8	+ 6.0

Source : [20].

The essentiality ranking of the licensing authorities and the resulting shortage of raw materials set into motion a perverse 'vicious circle'. Firms were motivated to expand capacity to qualify for raw material licences. The licensing authorities were thus confronted with the excessive demands for imported capital goods, which 'justified' their diversion of relatively more of the available foreign exchange resources into capital goods and relatively less into raw materials. As a consequence, during the three years from 1960/61 through 1962/63, imports of capital goods increased 50 per cent, while imports of raw materials were essentially constant (see Table VI).

TABLE VI
GROWTH OF IMPORTS OF VARIOUS CATEGORIES, 1957/58—1962/63

(In million rupees at current prices)

Years	C _a	RC _a	RC _o	C _o
1957/58	717	323	152	858
1958/59	629	300	165	485
1959/60	989	439	305	728
1960/61	1,210	570	418	989
1961/62	1,460	468	453	729
1962/63	1,903	478	505	932

Source : [27].

So strong was the bias in the licensing system towards capital goods imports that not even the rising foreign exchange reserves led the authorities to increase imports of raw materials. Starting in October 1962, reserves rose 40 per cent by June 1963 and remained relatively high well into 1964. In spite of this rise in reserves, licensing by the Chief Controller of Imports and Exports (CCI&E) was cut back by 12 per cent from July-December 1962 to January-June 1963 and, although total CCI&E licensing increased somewhat (7 per cent) in the next shipping period, industrial licenses were reduced by an additional 5 per cent in July-December 1963 [27].

Apart from creating idle capacity, Pakistan's import licensing system resulted in serious economic and administrative problems, and they led the authorities to take several steps towards liberalizing imports. Introduction of the 'Free List' is known to be a bold step in this direction. One of the major aims of the Free List was to facilitate a solution to the idle capacity problem. Although there are no published studies about the impact of Free List on the level of utilization, there is an agreement among informed observers that this goal of the Free List was to a large degree achieved. After its introduction, industrialists were said

to be able to get their raw materials more readily and more cheaply because they no longer had to buy from high-priced commercial importers and blackmarket sources [27].

It is, however, alleged that the Free List was not in fact very 'free' and some major restrictions and qualifications surrounded the free list. Moreover, the trend of liberalization could not continue beyond July 1965. The postponement of the Consortium meeting and the outbreak of war with India in 1965 prevented the import policy for 1965/66 from being carried out, and resulted in a return to more restrictive licensing.

Thus we see that the policy of import licensing affected the level of utilization both (a) by reducing the availability of imported raw material and (b) through inducing an expansion of unneeded capacity.

Project-bias of Foreign Aid

In general, project assistance increases capacity to produce and commodity assistance permits increasing production from given capacity. Although this distinction may not be meaningful in particular cases, nevertheless the Pakistani data showed that commitment for non-project aid tend to be disbursed rapidly without piling up in the 'pipeline', which suggests that on the whole, they consist of imports that can be readily used up in existing installations.¹⁵

¹⁵For example, the table shows the commitments and disbursement of non-project aid to Pakistan during the Second Five Year Plan period.

TABLE
NON-PROJECT ASSISTANCE FOR PAKISTAN DURING THE SECOND
FIVEYEAR PLAN

Years	Commitments	Disbursements	(millions of dollars) Balance in Pipeline
Balance on 30-6-1960			108
1960/61	90	101	97
1961/62	86	94	89
1962/63	130	134	85
1963/64	185	165	105
1964/65	200	200	105

Source : [17].

It is clear from the table that commitments and disbursements balance year by year and Pakistan ended the period with less in the pipeline than at the beginning despite a doubling of non-project assistance.

If an excessive share of the available flow of foreign aid is allocated to new projects, it can only mean that producing facilities requiring for their operations maintenance imports will run at a fraction of capacity. In Table VII we have assembled information about the commitments of project and non-project aid in various years from 1960/61 to 1966/67.

It is seen that in most of the years, commitments of commodity aid was less than 40 per cent of the total. The share of commodity aid never exceeded 50 per cent of the total aid. The preference of the aid donors for specific capital projects (with procurements usually tied to the country of origin) tends to confront aid receivers with the difficult choice of adding to capacity, even if it will not be fully utilized. Exactly this is what happened in the case of Bangladesh and Pakistan.

Overinvoicing

An overvalued exchange rate and the existence of a black market for scarce foreign exchange encouraged industrialists and businessmen to resort to the practice of overinvoicing which had serious impact on the rate of utilization. As new investment is self-contained, it gives the industrialists much freedom to choose from amongst the suppliers. This leads to competition among suppliers and hence to a higher overinvoicing profit. In contrast, the industrialist seeking balancing equipment has less freedom since the equipment must fit into the existing plant. This lack of freedom lowers overinvoicing profits.¹⁶

Industrialists, therefore, normally tried to devote as much as possible to new equipment to expand the capital stock, and as a concomitant, as little as possible to maintenance and balancing equipment to increase the utilization of existing capital.

The factors like-capital-bias and rigidity of licensing system, project-bias and tying of foreign aid, overinvoicing, etc. all affect the degree of capital utilization through favouring imports of capital and discouraging imports of raw materials and spare parts, and thus reducing their availability. Hence, the simultaneous impact of these factors can be seen by relating the rate of utilization of different industries with the degree of dependence on imported raw materials and spare parts in each case.

This we tried to do by using the data from a survey of capacity utilization in the manufacturing industries of Bangladesh conducted by the Central Statistical

¹⁶See also [30].

TABLE VII

COMMITMENTS OF PROJECT AND NON-PROJECT AID, 1960/61—1966/67

Years	Commitments of Project Aid	Commitments of Non-project Aid	(2) as % of (1) + (2)
	1	2	3
1960/61	144	95	39.75
1961/62	127	90	41.47
1962/63	340	130	27.66
1963/64	394	185	31.95
1964/65	296	172	36.75
1965/66	287	124	39.87
1966/67	269	235	46.63

Source : [21; 22].

Office.¹⁷ The proposition that the industries heavily dependent on imported raw materials and spare parts are forced to under-utilize the installed capacity was tested by using a regression equation between the level of utilization (U) on the one hand, and the dependence on imported raw materials (RM) and spare parts (SP) on the other.¹⁸ The equation was estimated by using the OLS method; and the result obtained is shown below.

$$U = 96.19240 - 0.36454RM - 0.26094SP$$

$$(6.84560) \quad (0.08510) \quad (0.10196)$$

$$\bar{R}^2 = 0.3952; \quad F(2.58) = 20.61$$

The figures within the parentheses are the standard errors.

As expected, the signs of both the regression coefficients are compatible with our hypothesis above. Furthermore, the coefficients of both RM and SP are significant at 99 per cent level. The value of the F ratio is also significant at 99 per cent level, showing that a strong relationship exists between the level of utilization and the dependence on imported raw materials and spare parts. The coefficient of determination is low for the obvious reason that these two independent variables, though very important, are not expected to explain all or most of the capacity utilization.

¹⁷This survey [5] covering the calendar year 1965 provides information about the actual and rated full-capacity production, total full-capacity requirements and import requirements of raw materials and spare parts, and the actual consumption of raw materials and spare parts both indigenous and imported.

¹⁸RM and SP were calculated by taking the ratio of import requirement to total requirements of raw materials and spare parts. U is calculated here by expressing the actual production as a percentage of the rated full-capacity production.

If the dependence on imported raw materials and spare parts explains some part of the underutilization of industrial capacity, then the actual availability of these should also explain the degree of capacity utilization in the manufacturing industries of Bangladesh. Denoting the availability of raw materials and spare parts by ARM and ASP respectively, and using subscripts *m* and *d* for imported and domestic resources respectively, we fitted a regression between *U* and ARM_m , ARM_d , ASP_m , ASP_d . The estimated equation is shown below :

$$U = -5.83175 + 0.37980ARM_d + 0.41929ARM_m + 0.13718ASP_d + 0.10331ASP_m$$

$$(5.21170) \quad (0.09312) \quad (0.09115) \quad (0.09753) \quad (0.07098)$$

$$\bar{R}^2 = 0.7672; \quad F(4.56) = 50.43,$$

ARM and ASP are measured as the ratios of actual consumption to full-capacity requirements of raw materials and spare parts respectively. The four independent variables incorporated into the above equation together account for about 77 per cent of the capacity utilization in the large-scale manufacturing industries of Bangladesh. Regression coefficients of both ARM_d and ARM_m are significant at 99 per cent level while those of ASP_d and ASP_m are significant at 90 per cent level.

These results thus point to the fact that the shortage of raw materials and spare parts was mainly responsible for the low rates of capacity utilization in the manufacturing industries of Bangladesh. This is in perfect agreement with the experience of other LDCs where the shortage of raw material is often cited to be one of the important factors responsible for the idleness of capital.

Labour Problems

One of the important factors which can create supply bottleneck and effect utilization of capital in LDCs like Bangladesh is the labour problem. This problem has two aspects: (a) general shortage of skilled labour and (b) labour troubles causing work stoppages, absenteeism, etc.

Although the LDCs like Bangladesh are characterized by a plethora of unemployed labour, skilled labour is often supposed to be one of the scarcest factors in these countries. The inability to hire a sufficient number of skilled worker needed to man the second and/or third shifts may be a major factor hindering shift work in industries heavily dependent on skilled labour.

Work stoppages and absenteeism are undoubtedly important reasons for the low level of utilization in the industries of Bangladesh. In many cases labour disputes decrease not only the capacity utilization of one particular

industry in which work has stopped, but also that of other enterprises that have run short of raw materials as a result of work stoppages at their suppliers' enterprises.

Unfortunately, the quantitative significance of these two factors could not be examined due to a lack of necessary informations. If the degree to which various industries are dependent on skilled labour were known, we could see whether lower levels of utilization are also associated with a higher degree of dependence on skilled labour. Similarly, it remains to be seen whether the industries with lower utilization are also those affected most by labour troubles.

V. PRODUCT END-USE AND CAPITAL UTILIZATION

It is often suggested that there is a relationship between levels of utilization and the use to which an industry's products are put. The suggestions regarding the nature of the relationship are, however, conflicting. While consumption goods firms are said to operate at generally higher levels than are intermediate or capital goods industries [9], there are studies suggesting exactly the reverse [4; 24].

In the case of Bangladesh, simple averages do show a definite pattern. Consumption goods industries appear to operate at higher levels of utilization than intermediate or capital goods (see Table VIII).

TABLE VIII
CAPITAL UTILIZATION BY END-USE

Product Category	Rate of Utilization (simple average)	Rate of Utilization (weighted average)
1	2	3
Consumption Goods	43.56	42.53
Intermediate Goods	37.16	39.01
Capital Goods	35.72	37.54

But two questions may be raised against the usefulness of these simple averages: first, they do not take into account the influence of other variables analysed earlier; second, it has been pointed out that very few industries' output can be classified simply as 'consumption' goods—more typically an industry as broadly aggregated as ours will turn out some of each [37].

The second question, of course, seemed to be of some importance, and we tried to take account of this. From a study based on the input-output table, we know the proportion of the products of each industry sold into each end-use

[37]. Using these proportions as weights, we calculated a weighted average of utilization rates for the three groups of industries. These are shown in column (3) of Table VIII. Though these weighted averages also show a clear pattern, the difference now seems less persuasive. Moreover, we tried a regression of utilization rates on the proportion of products sold into each end-use (separately for the three groups). None of the regressions, however, showed any significant relation between the rate of utilization and the product-use measures.

Thus we see that the relationship between the rate of utilization and the end-use of product is not conclusive in the case of Bangladesh. The data do not seem to support Hirschman's assertion that "the risk of excess capacity is lowest when the project's output is widely spread as an input over many sectors (or regions) or when output goes overwhelmingly to final mass-consumption demand; the risk is bigger the greater is the concentration of the project's output in a few final consumers or on a few cells of the interindustry matrix" [9, p. 73].

VI. UTILIZATION IN POST-LIBERATION BANGLADESH

Our analysis in the last few sections was based on data for the period before the liberation of Bangladesh. Available evidences, however, point towards a very low level of utilization in the post-liberation Bangladesh as well. But unfortunately, the type of analysis we have done in the last few sections cannot be extended for the post-liberation period due to a lack of necessary data. Nevertheless, it can probably be safely suggested that the major variables affecting the level of utilization of the capital stock have remained unchanged.

For example, the shortage of raw materials and spare parts seems to be all the more important in the context of the low level of utilization in post-liberation Bangladesh. The First Five Year Plan points out that the shortage of raw materials, spare parts and consumables "due to inadequate and untimely import authorizations has caused a large reduction in output of mills and enterprises" [2, p. 206]. It is interesting to note that to ensure utilization of industrial capacity on single-shift basis, annual imports of Taka 318 crores are required. For the three shipping periods from January 1972 to June 1973, this comes to Taka 477 crores. Against this the government allocated in its import policy for the three shipping periods a sum of Taka 283 crores, while the issue of licence and L.C's opened up to April 15, 1973 have amounted to Taka 194 crores and Taka 126 crores respectively. Imports during this period have been much lower than the L.C's opened due to time lags in shipment [2]. It is thus quite apparent that the industrial sector has faced something of an import famine in relation to its estimated annual requirements for effective capacity utilization in industry. Shortage

of imported raw materials and spare parts thus appears to be an important factor affecting the level of utilization during the post-liberation period.

Next we come to labour problems. We have suggested in Section IV that labour troubles causing work stoppages, absenteeism, etc. can also be responsible for the low utilization of the capital stock. In this context, it is possible to argue that nationalization can change the whole setting of industrial relations and thus reduce the potentials for conflicts giving rise to labour troubles. And since a major segment of the industrial sector has been nationalized after liberation, it is reasonable to expect the magnitude of industrial conflict in this period would be much smaller. One study, however, concludes that the post-liberation period has been characterized with relatively higher magnitude of industrial conflict than any other period before liberation [6]. In fact, a highly unsatisfactory state of industrial discipline and the inability to motivate workers after nationalisation have caused frequent labour troubles causing work stoppages leading to low utilization of the capital stock and a loss of industrial output. Unfortunately, a lack of necessary data precludes a statistical test of this statement, and as such it remains a mere hypothesis which can be tested only by further research in the area.

VII. SUMMARY AND CONCLUSIONS

Although our data are very limited, some general conclusions may be drawn from the empirical analysis.

First, what is known as the economic analysis of capital utilization may not be of much relevance for an underdeveloped country like Bangladesh. Although it is difficult to infer the value of the elasticities of utilization and of mechanization, capital-value added ratio can be taken as a reasonably good indicator of the latter. Further, in Winston's theory of capital utilization, capital intensity is seen to influence the level of utilization directly. Our data, however, failed to reveal a strong relationship between the two. Similarly, there is no evidence of any relationship between labour productivity and utilization. The only variable which is seen to be significantly related to utilization in Bangladesh data is firm size; and this supports Marris' stress on scale economies. The relation between the size of market and utilization is also not conclusive; while exports do not seem to have any influence on utilization, the (positive) relation between imports and utilization is all the more difficult to explain. It seems that imports, by pointing out the sectors whose products are in great demand and where acute shortages persist, only indirectly affects utilization.

Second, inefficiency and dubious economic policies are seen to influence utilization strongly. This is seen from the relationship between the dependence on imported raw materials and the rate of utilization, for as we have analysed, the policies pursued within the domestic economy resulted in an irregular and insufficient flow of raw materials and other maintenance imports from abroad. The policy of import licensing, project-bias of foreign aid, overvaluation of the currency giving rise to the practice of overinvoicing have also encouraged the creation of additional idle capacity directly. However, these factors alone cannot explain much of the underutilization of capital and one is forced to look for other explanations which may come from a variety of sources like the shortage of skilled manpower, labour troubles or power disruptions causing work stoppages, sociological factors hindering the introduction of multiple shift work, and so on.

Finally, the evidence of any relationship between utilization and the use to which the product of a particular industry is put is also weak. The type of market—consumption, intermediate or capital—does not seem to be relevant for utilization.

Thus the significance of our findings is that no generalization regarding the factors responsible for low utilization of capital in LDCs seems to be possible. While Winston's results from West Pakistan data "are consistently compatible with an essentially economic analysis of capacity utilization and supports its applicability to underdeveloped countries", our results are not so; and it may be dangerously misleading to generalize from one or two evidences. The reasons for low utilization and their relative importance may vary from case to case. It may even be difficult to explain much by relying entirely on economic factors. In such cases, it may be necessary to go beyond economics and investigate the sociological and psychological factors influencing the workers' as well as the society's attitude towards shift work.

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Appendix 1

Utilization Data

For the purpose of cross-section analysis in Section III, fifteen manufacturing industries were selected on the basis of value added. Names of these industries which accounted for more than 90 per cent of value added in 1968/69 are shown in Appendix Table A-I. We are describing below the methods of calculating the values of all the relevant variables. And the final results of these calculations which were used in the regression analysis of Section III are presented in Table A-I. For more detailed background tables, the reader is referred to [12].

The Rate of Capital Utilization

The Census of Manufacturing Industries, 1968/69 [1] gives information about the capacity output and actual output for each sector, and we could use them for calculating the rate of capital utilization. However, it is not clear whether the capacity output reported in the CMI is calculated on the basis of single shift working or multiple shift working. For this reason, we decided not to use this data for our purpose. Instead, we used another information also contained in the CMI—information about the number of shifts worked in an industry. From this data we calculated the average number of shifts worked by an individual unit which is equal to the total number of shifts worked in a sector divided by the number of units in that sector. Unfortunately, there is no unanimously decided standard of full capacity utilization rate with which we could compare the actual performance of the industries. For this purpose, we had to depend on some arbitrary assumption. We have assumed 900 shifts in a year to be full capacity utilization rate and expressed the actual number of shifts worked by a unit as a percentage of this rate. The percentage thus calculated is used as the rate of capital utilization and is shown in Table A-I. Though the calculation seems to have been based on rather arbitrary assumption about the full utilization rate, we think that our assumption has a reasonable amount of plausibility. We have assumed that excluding weekly holidays and other holidays a firm should work 300 days in a year and 3 shifts each day. We have also assumed that maintenance and repairs can be done during the weekly holidays. On these grounds, the assumption 900 shifts a year to be the standard utilization rate does not seem to be wild guess.

Market Structure (N)

The CMI 1968/69, gives information about the number of reporting units in each sector. We have used this information as an indicator of the market structure. The values of this variable are also shown in Table A-I.

Firm Size (S)

The CMI 1968/69, contains information about the value of annual production in each sector. We have divided this values for each sector by the number of reporting units in the corresponding sector, and used this average annual production by the reporting units in each sector as a measure of average firm size. The values of this variable are also shown in Table A-I.

Imports as a Percentage of the Total Supply (M)

Imports here are calculated at market prices. There are two components of imports—one from abroad, the other from West Pakistan. The c.i.f. value of imports of various items from abroad are available from a report by the planning Department of the then East Pakistan [23]. To these c.i.f. values we added taxes paid in order to arrive at imports at market prices. The amount of taxes paid were calculated by applying the average rates of duty on various imported goods available from [25].

The second component of imports—consisting of imports from West Pakistan is available at market prices; and hence, there was no need to adjust it. These imports were added to the value imports from abroad calculated at market prices. This gives us the value of total imports. The value of domestic production was added to the imports to get the total supply. The value of total imports expressed as a percentage of total supply (M) is shown in Table A-I.

Exports as a Percentage of Domestic Production (E)

Domestic production was calculated at factor cost. The CMI gives the value of production at market prices. By subtracting the amount of indirect taxes paid (also available from the CMI) from the value of production, we got the gross value of output at factor cost.

Exports are measured at f.o.b. prices. Exports again have two components—exports to foreign countries and those to West Pakistan. The report by the Planning Department [23] gives the values of exports to West Pakistan are, however, available at market prices. They were converted to f.o.b. prices by sub-

tracting a certain percentage from them—the percentages being the same as that represented by indirect taxes in the total value of production. The two components of exports. The results of these calculations are shown in Table A-I.

Labour Productivity (L)

This was calculated by dividing value added in each sector by the total number of labourers. This is shown in Table A-I.

TABLE A-I
UTILIZATION DATA

Sectors	U	S	C/V	L	E	M	N
Sugar	31.33	100.89	7.87	6.74	0.01	14.38	12
Edible Oils	45.55	19.87	1.51	8.72	0	30.49	53
Tea	34.44	32.32	1.04	26.10	76.00	1.00	97
Cigarettes	60.00	276.60	0.39	59.56	0.18	20.17	15
Cotton Textiles	98.44	105.14	2.14	7.25	0.84	60.29	42
Jute Textiles	71.88	219.19	3.41	4.45	93.21	0	50
Rayon	100.00	610.96	5.53	18.22	0	0	1
Paper	74.44	108.32	22.59	59.51	70.86	15.55	5
Printing & Publishing	34.66	3.51	1.07	7.63	0.43	18.36	107
Leather	31.55	15.01	1.34	8.13	91.92	4.99	84
Fertilizers	47.55	103.44	8.85	22.57	0.03	4.89	5
Matches	39.00	45.97	0.92	5.19	51.32	0.02	17
Cement	100.00	60.92	4.96	6.07	0	75.83	1
Iron & Steel	28.33	47.32	2.73	15.53	0	64.17	27
Shipbuilding	37.89	21.92	3.43	5.76	0	31.33	17

Choice of Ground Water Irrigation Technology in Bangladesh

by

LAWRENCE M. HANNAH*

This study compares three alternative ground water technologies in terms of their economic and social appropriateness for Bangladesh. A modified form of social cost-benefit analysis is applied to the three technologies : hand pump tubewells, shallow tubewells (0.5 cusec) and deep tubewells (2 cusec). The methodology is limited to costs which means that the results can be used for ranking purposes only. The calculation of standard unit costs is subject to sensitivity tests on the price for unskilled labour (pumping), the value of foreign exchange, the lifetime of capital goods and variations in command areas. The results emphasize the economic dominance of power pumping technologies at market prices in Bangladesh. Handpump tubewells only become the optimal technology when labour is shadow priced at one-half or less of the current wage. The ranking of technologies is also not at all sensitive to the price of foreign exchange. The report emphasizes that attention needs to be paid to institutional-social questions as well as the technical considerations in order to avoid selecting a technology which has no potential for productivity increases.

I. INTRODUCTION

The importance of augmenting food production in a nation with fifteen hundred people per square mile is obvious. In Bangladesh, additional agricultural output will have to come from multiple cropping which requires, *inter alia*, increased irrigation. This study is concerned with the choice of ground water irrigation pumping technology which will necessarily be the major type of irrigation expansion in Bangladesh.¹ The problem of choosing the optimal technology is important not only because of the country's overall resource shortage but also because other much-needed agricultural inputs such as fertilizer, control chemicals and HYV seed also require considerable additional investment. There is potential for high returns in Bangladesh's agriculture sector through more efficient use of all resources.

Surface water irrigation is important in Bangladesh but this study is limited to ground water irrigation technologies for a number of reasons. Ground water and surface water schemes are difficult to compare. They are not treated as alternative choices in most instances than pumping up water from below the ground. It would be difficult to obtain the very detailed information required for the inclusion of large surface water projects. Finally, as a matter of policy relevance, ground water technology is the portion of the irrigation program in Bangladesh that is most likely to be expanded in the future.

*The author undertook the initial work for this study while he was a Visiting Scholar at BIDS in 1976.

¹Recent IBRD-supported studies have estimated that surface water irrigation is almost fully exploited at present and that ground water sources are sufficient to irrigate up to 75% of the remaining cultivated land area.

At the present time, considerable resources are being applied to increase the acreage under all types of irrigation. In particular, the expansion of ground water pumping facilities has received high priority in the plans of the national government, international aid agencies, and local private entrepreneurs. Although some research has been undertaken on irrigation technology in Bangladesh [2], little has attempted in the way of a direct comparison of manual and powered pumping methods.²

The objective of this study is to compare three ground water irrigation technologies, deep tubewells, shallow tubewells and hand pump tubewells, in terms of their economic appropriateness for Bangladesh. Selection of the optimal technique among these three is the principal task of this paper. Optimality is defined as the minimum social cost choice, which implies that factor input proportions correspond to the society's relative endowment and that the process is technically efficient. The latter qualification can be interpreted as selection of a point on the isoquant rather than inside it.

The general methodology of this study is to apply a modified form of social cost-benefit analysis to the problem of selecting the optimal technology. There are presently three distinct methods in use for lifting ground water for irrigation in Bangladesh: deep tubewells, shallow tubewells, and hand pump tubewells (henceforth DTW, STW, HPT). The special concentration on hand pump tubewell technology is warranted because of the recent rapid expansion of this method and the apparent suitability of the technology [3]. Rather than use the simple measure of labour-intensity, this study seeks to assess the relative economic appropriateness of each type of pump in a more complete framework and to suggest the best resource utilization strategy for ground water irrigation development in Bangladesh.

II. APPROACH TO THE PROBLEM

The application of social cost-benefit analysis has required some changes and adaptations. Since 'benefits' are complicated to calculate and to interpret, the approach has been modified to focus on the calculation of what will be referred to as the Present Social Cost (PSC) of each technology. The estimation of output is particularly difficult for agricultural projects since it requires judicious assumptions about yields, input levels and proportions, future commodity prices and alternative cropping opportunities. The technique used in this paper avoids most of these problems by simply comparing the PSC for each of the three technologies for a standardized output unit. Assuming that the

²Three authors who have produced papers on this topic are T. R. Islam of the Planning Commission, Dacca, John W. Thomas of Harvard University, and Steven Allison of IBRD [1; 4; 5].

source of water makes no difference to the irrigation benefit outcome, the PSC for each technology for equal command areas is taken as a relative index of 'economic appropriateness'.

The modification of social cost-benefit analysis does limit the approach to some extent. Since there is no absolute measure of the desirability of a project, like the internal rate of return, the results cannot be directly compared with other cost-benefit type studies. For the same reason, there are no standards such as the rate of interest which can be applied to judge a single project. PSC serves only to rank the three technologies examined in this study. It may well be that the next best investment in agriculture is not irrigation at all but the present study begs that issue.

Let us examine the application of the PSC approach. The criterion for ranking is the 'social' cost per unit of output. Output is defined as acres irrigated. An inventory of the inputs used and conversion factors where private prices do not accurately reflect the value of inputs to the society is required. For each technology, there are two basic cost components: the initial investment and an annual charge for operating and maintenance. In physical terms, it is also necessary to know the useful lifetime of capital goods, the typical command areas and the labour inputs. The PSC is then obtained by discounting the stream of costs over the equipment lifetime, standardized for differences in command areas. The additional value of a longer stream of benefits, associated with longer capital goods lifetime, is introduced by dividing the output-standardized PSC by a factor of the present worth of an annuity of one for the period of the project.

The Present Social Cost of each technology was calculated from the following equation :

$$PSC = \left(\frac{A + B(C) + D(E) + F(G)}{H} \right) \div D$$

A = initial local currency costs (taka)

B = shadow price of foreign exchange (taka/dollar)

C = initial foreign exchange costs (dollars)

D = present value of an annuity of one for "x" years at "y" per cent

E = annual maintenance and operating costs (taka)

F = shadow price of unskilled labour (taka/day)

G = annual man-days of pumping labour required

H = command area (acres per pump)

"x" = useful lifetime of capital goods (years)

"y" = discount rate.

Whenever cost-benefit analysis is utilized there are likely to be a number of factors which are difficult to include in the calculation or are hard to quantify

but which do have a significant impact on the desirability of the project. An example of this type of problem is that a project or a machine may not perform at expected levels. To the extent possible, these elements have been taken into consideration in the choice of values for the variables. For example, since it is known that actual command areas for large power pumps are much smaller than the technically feasible levels,³ the estimates included are specified in terms of 'present situation' and 'technical potential' if the problems could be ironed out. This is a relatively important point because many analysts of best technology choice have mistakenly found a technology too attractive using the manufacturers specifications or alternatively have discarded an option on the basis of poor field performance that might have easily been raised if the technical potential were fully understood. A second major area of difficulty—externalities—is frequently associated with the calculation of the benefits of a project. This problem has been minimised by the adoption of the PSC methodology.

The three technologies under consideration are alternative methods of pumping ground water to the surface for irrigating crops. Both power pumps were designed for that purpose while the hand pump was and is used primarily for obtaining drinking water. Let us briefly look at the technical aspects of each method.

The most common hand pump in use in Bangladesh is a standard drinking water pump of the pitcher style seen in the U.S. The pump body is cast in Bangladesh from imported pig iron. An improved version standard pump has been developed with UNICEF assistance and is now in wide-spread use throughout the country. Parts and service are available in most locations at low cost. For good performance, the static water table needs to be no more than 20 feet which is the case for about 75% of potentially irrigable land in Bangladesh during the peak winter pumping period. Under continuous pumping the output of the (number six) hand pump is estimated at four gallons per minute.

The two power pumps are very similar in all respects except for the size of the well and the pump capacity. Each utilizes a diesel engine to power a surface mounted pump. The well casing and strainer can be either of cast iron and brass mesh or now, more commonly, of PVC or fiber-glass because of low cost. Almost all tubewells for STW and DTW are drilled by power rigs imported into Bangladesh. The STW used in this example draws from an average depth of 110 feet through a 3" tubewell and with a 4 horse power

³Since the reasons for poor field performance may often be non-technical (i.e., institutional or social), it is particularly useful to consider the range of values for this variable. This study does not rigorously consider which factor is to blame for the poor performance of deep tubewells but does show the impact of improved operation, however achieved.

engine yields about 0.5 cusec. The DTW is a 6' well with a 24 horse power engine and a 2 cusec burbine pump.

The initial cost of hand pump tubewell is almost equally divided between local and imported costs.⁴ In contrast, the shallow tubewell is largely constructed from imported inputs. The deep tubewells show an appreciably smaller portion of imported costs due to the substantial drilling and installation expenses. The operating costs clearly favour the HPT in that they are totally local for pumping labour while the two powered pumps must depend completely on imported fuel for operation. Thus, the effect of the cost of foreign exchange upon the choice of technology is of interest.

Two kinds of measures are used in this study. The first might be characterised as the 'hard' numbers which simply involves searching out the correct value. Examples of these are the initial cost of each piece of hardware, the average maintenance and operating cost, and the number of days pumping per crop season. The 'soft' numbers, by contrast, are those which are not readily measured in the real world and are thus subject to considerable debate. Two examples are the shadow price of foreign exchange and the value of unskilled labour. In the case of 'soft' data a range of values for each variable has been tried in the calculations and the results treated as sensitivity analysis.

Concrete cost data on the various pumps and associated costs were obtained from the responsible ministry and international agencies involved in the procurement of such hardware.⁵ Shadow prices for unskilled labour and the appropriate range of shadow exchange rates were derived from reports studies available to the author. The important measure of average command areas was obtained through personal interviews supplemented by 'official' reporting of this measure.⁶

Let us examine the detailed nature of the data collected. The first step was to break down each technology into its individual parts in order to determine the cost and the source of each piece. In the cases of the two powered pumps, the principal items are the engine, the pump, the

⁴From Table I, we can calculate that 52% of the value of a HPT is imported, 68% of a STW is imported, and 44% of a DTW.

⁵The cost figures were obtained from UNICEF and are for the Winter season of 1975/76. The imported component of the cost may be understated as UNICEF was able to purchase in large quantities and import into Bangladesh without payment of any duties or taxes.

⁶There is good reason to believe that the actual command areas vary considerably from tubewell to tubewell. The official estimates are somewhat larger than those reported in the field but this may be partially due to declining command areas over time for individual wells.

TABLE I
INPUT DATA

	HPT	STW	DTW
Imported			
(U.S. dollars)			
Pig Iron	12.08		
Hard Coke	1.45		
Bolts, Nuts, Lock Washers	0.70		
Jam Nut for Piston Rod	0.04		
Blind Pipe (40')	14.40		
Diesel Engine (4 H.P.)		300.00	
Pump		60.00	
Pipe PVC (80')		140.00	
Tools		40.00	
TW Boring (rev.-cir.)			333.33
Bail Plug			60.00
Screen			300.00
Blind Pipe			250.00
Gravel			250.00
Pump			1,000.00
Engine			875.00
Gears			625.00
Local (Taka)			
Pivot Pins	12.00		
Bucket	3.00		
Check Valve	3.00		
Manufacturing	89.00		
Retail Profit	10.00		
Piston Rod	7.00		
Transport	60.00		
Strainer (6')	180.00		
Installation	40.00		
Land Preparation			7,500.00
Drilling			20,000.00
Installation			10,000.00
Pump House			15,000.00
Blind Pipe (14"-80')			16,000.00
Reducing Socket			750.00
Pump Head		300.00	
Installation		1,000.00	
Maintenance and Operating Costs (Taka per season)			
PVC Bucket	6.00		
Piston Rod	1.75		
Nuts and Pins	8.00		
Check Valve	3.00		
Labour (man-days)	100.00		
Spares and Installation		1,600.00	2,228.00
Fuel and Oil		2,750.00	6,600.00
Pump Driver		1,000.00	1,500.00

pump house and the various pieces of blind pipe and screen. For the hand pump tubewell, it was possible to determine the raw material inputs going into pump production, all of the individual pump parts as well as the pipe and strainer costs. Transportation to the site and installation are included as separate items for all three technologies.

Locally procured parts were priced in taka and imported ones in dollars net of any duty or customs charges. The reason for excluding duty is that from the society's point of view, they are simply a transfer payment and do not constitute a real resource cost. These prices do accurately reflect the cost levels during the winter season of 1975/76. However, this view is a static one which cannot take into account future substitution possibilities between imported and locally produced items.

The two other major 'inputs' are the maintenance and operating costs and the appropriate number of years over which to amortize the capital equipment. Operating costs for each technology are relatively straightforward. Taking the standard, acre-inch requirement for *boro* rice and a pump with a known output, the pumping time was calculated and multiplied by the engine's fuel consumption times the price of diesel fuel. The actual consumption is somewhat higher than this because for technical reasons such as the seepage of water in distribution canals and poorly maintained engines maximum efficiency is never attained. For hand pumps, the operating cost is simply the labour input which is included separately in the equation.

Maintenance figures are of somewhat poorer quality. For deep tubewells and shallow tubewells, cost data supplied by the government ministry have been used. These are aggregate costs of parts and labour divided by the number of pumps to determine an annual cost. Hand pump maintenance costs are based upon the experience of part failure when these same pumps were being used for drinking water service. Having an average lifetime for each separate part, we have used that of the longest lasting part, the barrel and base, as the capital goods lifetime and have replaced the other components, as required, to determine an average annual maintenance cost over the lifetime of the pump. The installation cost is included whenever the farmer would not perform the service himself.

Useful lifetime of the capital goods proved to be subject to much more debate than any of the previously discussed items. The results would be expected to be reasonably sensitive to this variable because we are dealing with such short periods of time. For example, the best to the worst estimate of capital lifetime ranges from 8 to 15 years for HPT and 5 to 20 years for DTW. The huge

variation in the estimates of useful capital lifetime reflect maintenance as well as administrative difficulties such as obtaining the fuel allotment, theft of parts and the collection of irrigation charges. While these figures may be a distortion of technical lifetime, they do reflect the performance of each technology in Bangladesh at this time.

In Table II, three estimates of command areas for each technology are provided. Hand pump irrigation is the only case where empirical evidence

TABLE II
COMMAND AREAS FOR IRRIGATION TECHNOLOGIES

(acres)	HPT	STW	DTW
High	0.75	15	80
Medium	0.50	10	40
Low	0.50	7	30

is available on this point. The largest number in each case represents some sort of reasonable technical potential under Bangladesh conditions. The middle value has been taken from the existing reports and government documents⁷ and the low number represents our best estimate of the actual situation at this time. It is important to remember that we are not only interested in determining which is the 'real' value but also we want to know what effect an improvement in command areas would have on the choice of technology. The question of output levels of technology is important. There is a basic issue about whether the hardware selected is inappropriate or whether we have simply failed to take adequate measures to see that it works right in the field. While the former calls for new machines and 'appropriate technologies', the latter problem may be solved by giving more attention to training, supplementary inputs and organizational changes.

The shadow price of foreign exchange should reflect the economic opportunity cost of those funds to the society. More specifically, it could be treated as the rate at which domestic resources can be exchanged for foreign resources. While there is widespread agreement that a country like Bangladesh is very short of foreign capital and needs to use this input cautiously it is still difficult to put an exact domestic price on imported goods. It may be that there are a number of shadow exchange rates which should be applied to different types of imports. In this instance, we are only dealing with investment imports while excluding the consumption goods which utilize a large portion of many nations' foreign earnings.

⁷Primary source, Bangladesh Agricultural Development Corporation reports.

Also relevant is the fact that the Bangladesh taka was devalued by 70% in May 1975. Since the rate is fixed to sterling the declining value of the pound produced an effective devaluation of approximately 100% against the dollar in the period between May 1975 and January 1976. The official exchange rate at the end of 1975 was 15 taka to one U.S. dollar. The three shadow prices for foreign exchange include the official rate, a twenty per cent premium and a thirty-three per cent premium, i.e., 1.15, 1.18 and 1.20 taka to the dollar, respectively.

Finally, the remaining input, labour, was calculated for 100 mandays of pumping during the irrigation season. In many cases, this might be done by several people including the women and children of the household and by hiring labourers. While almost everyone agrees that, in general, unskilled labour is in excess supply in Bangladesh, the appropriate social price for labour inputs is not so easy to determine. The range of values used runs from the full private market price paid for farm labour (10 taka per day) to a zero shadow price of labour.

III. SPECIFIC QUESTIONS

The principal question is which of the three ground water technologies is socially optimal for Bangladesh? In contrast, we will also identify the present private optimum technology. The discussion of which policies might move us from the private to the social optimum are as important as the selection of the best choice. This analysis also gives us an opportunity to see which variables affect the choice and some idea of how they might be manipulated.

As previously mentioned, this methodology emphasizes the cost minimizing choice which effectively precludes selection of a 'dominated' technology. However, there are other considerations which enter into the ultimate decision about which technology is the best choice. In the case of irrigation, there may also be a differential impact of each method on linkages to and stimulation of the local economy, promotion of learning-by-doing, consumption externalities of increased food availability and the health of affected users.

Due to the element of risk or possible error for some of the variables, the effect of changes in these cases will be assessed. In particular, the sensitivity of the results to alternative values of the price of labour, the price of foreign exchange, the capital goods life-times and the command areas is examined. Let us now turn to the results of the calculations.

IV. PRESENTATION OF RESULTS

The three irrigation technologies are compared by considering the Present Social Cost (PSC) which has been calculated for each pumping method. Since there are several values for each variable in the calculation, the number of outcomes is quite high.⁸ However, only a few are relevant for consideration here because it is possible to group many of the assumptions together.

The first comparison was made on the basis of 'market' prices. This means that input prices are the actual amounts paid by purchasers and other values, such as command areas and capital goods lifetime, are the best estimates of what was actually happening, not some ideal. Specifically, labour is priced at 10 taka per day, foreign exchange at 15 taka per dollar, for command area and capital goods lifetime we use the medium levels, and a discount rate of 15% is used.

Under private 'market' prices, the cost of one unit of irrigation water in Bangladesh during the winter of 1975/76 was :

Hand pump tubewell	Taka 2,345.21
Shallow tubewell	Taka 783.41
Deep tubewell	Taka 879.09

Shallow tubewells clearly rank ahead of the two alternative technologies in this instance. The advantage is small, 12% over DTW, but large, about 300% over HPT. The precise meaning of the relative number is difficult to determine but it is clear that a magnitude as large as three times indicates significant cost differences.

An interesting use of the 'market' price comparison would be to see if the actual purchases reflect the relative advantages of one pumping system over another. Unfortunately, the highly differential subsidies made available to users of the different technologies would tend to distort the actual pattern of use. However, the high level of subsidy, often approaching 100% on DTW and the low level of subsidy on HPT, usually zero, make the widespread adoption of HPT even more astonishing.

One possible area of debate about the 'realism' of the first example might be in the command area assumptions. If we reduce that variable to the minimum, it is possible to see how the results are altered.

Hand pump tubewell	Taka 2,345.21
Shallow tubewell	Taka 1,119.16
Deep tubewell	Taka 1,172.12

⁸The basic PSC equation was solved almost 500 times in this exercise.

This pessimistic calculation does not change the ranking of the three technologies. However, the relative advantage of the power pumping systems is reduced.

There is really no debate that the socially optimal technology for a country such as Bangladesh needs to make use of the abundant supply of labour and, if possible, conserve other scarce inputs. In order to have this preference reflected in the calculation of the PSC, the labour inputs have been included at a lower cost. Although there is ample literature and discussion on the best way to set the shadow price of labour, the approach followed here simply takes two values, one-half the market price and zero, and calculates the PSC for each of the three technologies. Since there is no unskilled labour input for the two power pumps, the PSC only changes for HPT with changes in the price of labour. The results are :

Hand pump tubewell	Taka 1,345.21 (Taka 5/day)	Taka 282 (Taka 0/day)
Shallow tubewell	Taka 1,119.16	
Deep tubewell	Taka 1,172.12	

The relationship between the PSC and the shadow price of labour can be illustrated as in the following figure. What is obvious is that the PSC of the hand pump tubewells is extremely sensitive to the cost of labour and that the relative advantage of power pumping falls dramatically in the face of lower value labour inputs. At one-half the market wage, 5 taka per day, the power pumps are still slightly cheaper. A small reduction in labour costs switches the advantage to HPT and when the labour is considered as a socially costless input, the best technology choice is clearly hand pumps.

In contrast to the abundance of unskilled labour, almost all LDCs face a serious shortage of foreign exchange. Due to the detailed data available, it is possible for us to examine the effect of increasing the value of imported inputs separately. This is a stronger methodology than using capital as a proxy for foreign inputs as has been done in many studies. The initial calculations were at the market price of foreign exchange which is 15 taka per dollar. To test the sensitivity of the results, the value of foreign exchange has been increased first by 20% to 18 taka per dollar and then by 33% to 20 taka per dollar. The results are :

	0% premium	20% premium	33% premium
Hand pump tubewell	2,345.21	2,376.94	2,398.10
Shallow tubewell	783.41	826.23	854.77
Deep tubewell	879.09	934.28	971.07

(Labour at 10 taka per day and medium command areas have been used).

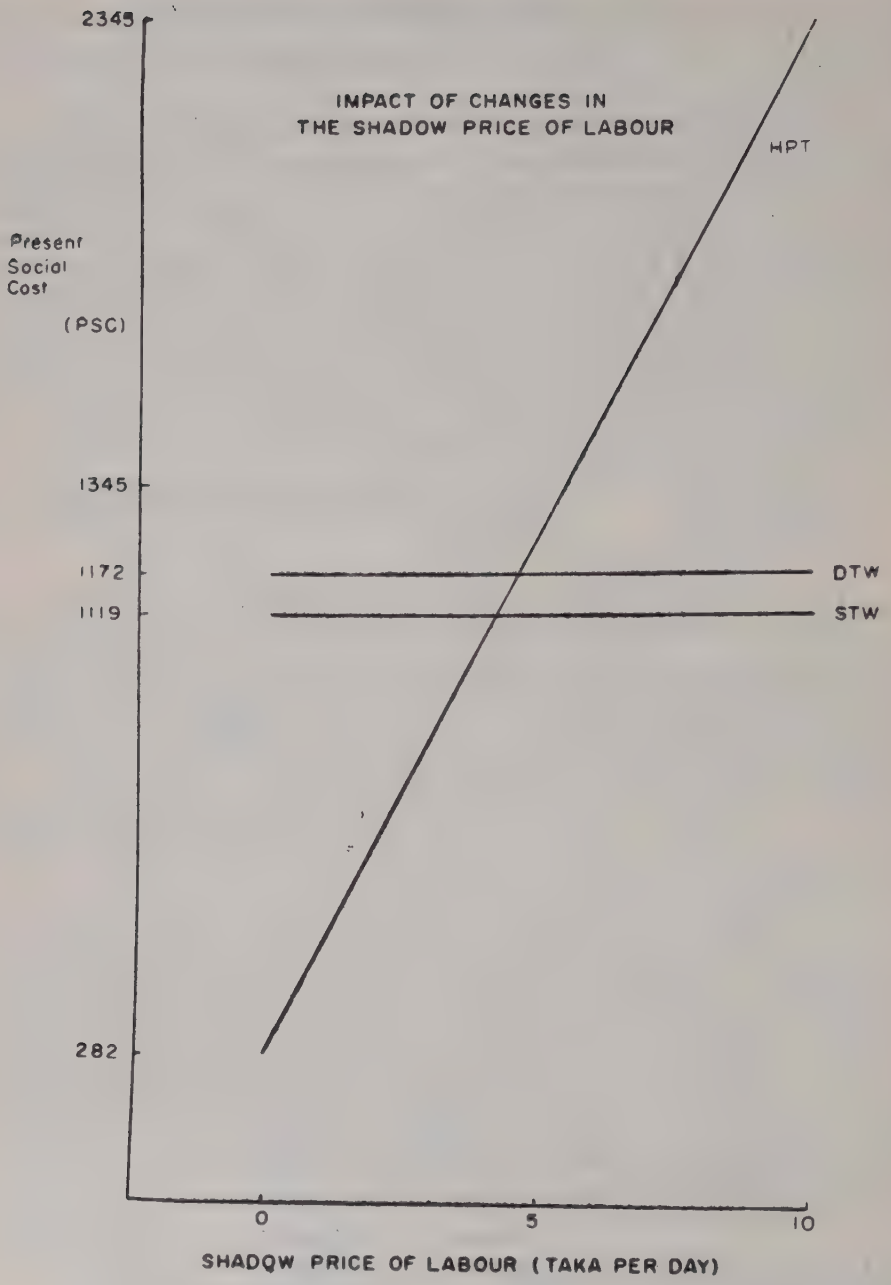


Figure - 1

The following figure shows that none of the technologies is very sensitive to the value of foreign exchange. The slightly steeper curve for the two power pumps is understandable in terms of the large proportion of imported inputs in their total costs. Most important, the ranking does not change under the alternative assumptions. Extrapolating our findings, we can calculate that, *ceteris paribus*, almost a 1500% premium would have to be applied to imported inputs before hand pumps moved from their present least desirable position to number one.

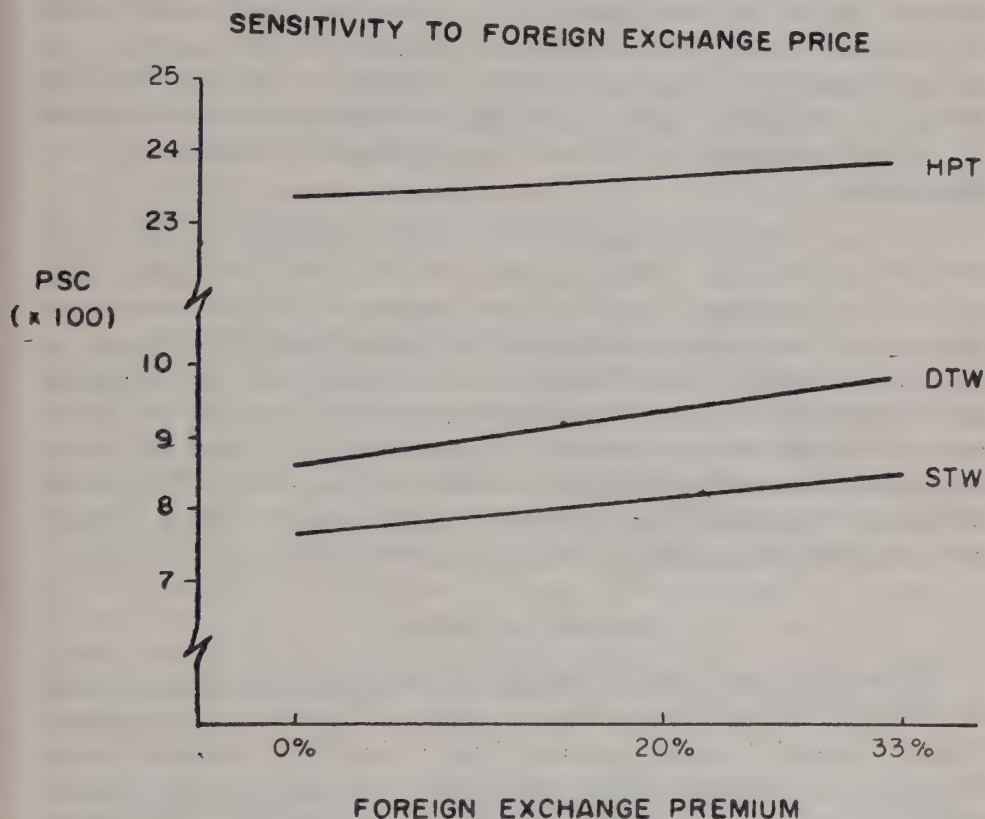


Figure- 2

The question which was raised at the outset was which of these three irrigation technologies is socially optimal for Bangladesh. Obviously, the answer depends entirely upon the level of relative prices which are assumed to reflect the society's 'true' values. We have examined how changes in individual inputs such as labour and imported capital affect the ranking and/or attractiveness of the three choices.

It is argued here that a reasonable set of values for the society at large may be foreign exchange at a 20% premium and unskilled pumping labour shadow priced at zero. The PSC's are :

Hand pump tubewell	Taka 376.94
Shallow tubewell	Taka 826.23
Deep tubewell	Taka 934.28

HPT is the lowest by a considerable margin. Thus it can be argued that given this reasonable estimate of the appropriate shadow prices, hand pump tubewells may be the best ground water irrigation technology for Bangladesh at this time. Even raising the price of labour to five taka per day only raises the highest cost technology, HPT at 1377 taka, to 20% more than the lowest cost technology, STW at 1180. For this type of calculation, a spread of this amount might be interpreted as indifference between the three technologies.

The most interesting conclusion from these calculations is the major divergence between the 'private' optimum and what we have calculated to be the 'social' optimum. The two power pumping technologies have a clear advantage in the 'market price' calculations which completely disappears as we move to 'social' prices. Observation of the patterns of actual ground water technologies tells us that despite the sizable advantage for DTW users, the demand or rate of return is sufficiently high to induce widespread use of much more costly technologies. It also seems clear that if the government subsidy were removed or spread more evenly among these three ground water irrigation technologies the technology mix would shift quite drastically.

V. CONCLUSIONS

All calculations based on current 'market' prices rank shallow tube-wells as the lowest cost ground water technology. However, as the assumptions are changed to reflect a less optimistic view of the ability to benefit from irrigation economies of scale, the relative advantage of power pumping methods to hand pumps declines dramatically. Holding labour at either the market price or one-half that level, as the command area per pump is increased, power pumps maintain their dominance. Only when labour is valued at zero does the hand pump become the optimal irrigation technology for tapping ground water.

It is clear that the two powerful assumptions in this model are the average command area per pump and the social value of labour for pumping. Changes in the former are likely to come about slowly and are treated separately

below. The critical role of the labour shadow price illustrates the basic nature of the questions involved. We must be able to answer the difficult problem of what set of relative price represents the society's real preferences to resolve this matter. If the present market price of labour of 10 taka per day is socially correct then the hand pump tubewell is an inefficient technology and its promotion may waste critical resources. However, if the 'cost' of labour is between zero and 5 taka per day, hand pumps are a competitive or even optimal technology choice for Bangladesh.

Once the optimal technology is determined, its adoption could be promoted in a number of ways. If the best technology is also the cheapest at prevailing prices, the market should do the job adequately. A subsidy could be offered as an inducement to encourage use of another technology not favoured by current 'distorted' market prices. For example, the present heavy subsidy bias toward deep tubewells could be reduced in order to influence private choices.

This paper also demonstrates that the usual narrow focus of the choice of technology studies on the physical characteristics of the hardware may produce misleading results. It is clear from the analysis that the institutional-social questions are at least as troublesome as the technical questions. For example, only a small increase in the number of cooperating farmers for each deep tubewell would give that technology a decisive advantage. The view that progress is only achieved by adopting the hardware to the receiving social and economic system is shown to be wrong. The importance of the linkage between the operation and the choice of technology in this case demands that further research ask to what extent better management of power pumping facilities is desirable compared to promotion of a new technology such as hand pumps.

Finally, although by no means least important, there will be many reasons for selecting particular technologies that are not reflected in these calculations but which should be considered in making policy. For example, even if hand pump owners are not the intended 'target group' the wages paid to pumpers certainly reaches a group that would not benefit directly from other technologies. The same could be said for the linkages that hand pump tubewells are likely to set up with the local economy both in physical terms and in the transfer of learning by doing that this innovation can provide.

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Should Bangladesh Participate in an International Buffer Stocking Arrangement for Raw Jute ?

by

SADIQ AHMED*

This paper has examined the case for Bangladesh being a party to an international buffer stocking arrangement for raw jute. The need for international buffer stock is established on the basis of two results. First, it has been found that magnitude of price and export value fluctuations are quite severe. And second, further examination has shown that supply fluctuations mainly have caused price and value fluctuations. It has also been pointed out that although buffer stock has important implications for long term viability of raw jute as a source of foreign exchange earning, it is basically a short term measure. Implementation of additional measures, involving both domestic policies and cooperation from importing countries in respect of removal of trade barriers, has to be ensured for keeping raw jute alive as a source of foreign exchange earnings for quite sometimes to come.

I. INTRODUCTION

1.1. Statement of the Problem and Some Background Information

Jute occupies an unique place in the economy of Bangladesh. On average (1972/73 to 1976/77), manufactured jute goods constituted 51.41 per cent of total export value while raw jute accounted for 31.12 per cent. One feature related to jute which has become a matter of great concern for governments of jute producing countries is fluctuations of jute price, both raw and manufactured, at the international level. Price variations coupled with quantity variations have caused severe fluctuations in export proceeds from jute. Moreover they are among the important factors behind the erosion of international market of jute. While consumers of raw jute in the European countries and in U.S.A. mainly, have gradually tended to shift from jute manufacturing to production of synthetic

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substitutes, consumers of jute goods have also been induced to shift to synthetics.¹ Fluctuations in price of jute have been traced to fluctuations in supply of raw jute. In order to ensure a more stable supply pattern of raw jute it has been proposed that a buffer stock be formed at the international level. The basic objectives of buffer stock formation would be (a) to stabilise the price of raw jute and thus stabilise earnings and (b) to strengthen the competitiveness of jute with synthetic substitutes.

The idea of formation of a buffer stock at the international level is not new and can be traced back to as early as December 1962. A study group on Jute, Kenaf and Allied Fibre was formed under the auspices of FAO. This study group suggested that for the time being two things may be done. First, coordination of nationally managed buffer stock and second, phasing of purchases by importers to smooth out in seasonal supply fluctuations. A Consultative Committee was also formed to explore the possibilities further. However, neither of the two recommendations were implemented.

So far as Bangladesh is concerned one thing was achieved. The Consultative Committee agreed upon setting up an informal indicative price range for Bangladesh (then Pakistan) raw jute export. Despite the weakness that this was not a formal arrangement and also that this has not always been in force, a certain degree of price stability has been attained. But cost has also been high. While benefit of whatever price stability that is achieved is shared by both the producer (Bangladesh) and consumers (importers of Bangladesh raw jute), Bangladesh alone bears the cost of operating a buffer stock as a part of indicative price range arrangement. Moreover, due to absence of coordination amongst individual producers of jute and also lack of cooperation from consumers in the matter of phasing of purchases etc., nationally organised buffer stocks have not performed very well.

Recently some new developments have taken place. The international community (basically UNCTAD) has come to recognise the unfairness of this arrangement. Also the needs for proper coordination amongst producers and cooperation from consumers for success of buffer stock have been recognised. Deliberations are being made for organising a buffer stock, comprising both raw jute and jute products, at the international level which will benefit both producers and consumers, and in which consumers will bear their due share of the cost.

¹Of course technological progress in synthetic production has enabled cost reduction and superior product but jute price fluctuations have encouraged massive investment in development of synthetics.

1.2. A Brief Review of the Theory of Buffer Stock

The idea of buffer stocking arrangement has stemmed from a consideration of the peculiarities of short run demand supply pattern of various primary commodities, mostly agricultural.

On the one hand, demand for most agricultural commodities including jute inelastic but stable in the short run. On the other hand, supply is also inelastic in the short run but significantly unstable. As a result of frequent changes in supply there are severe price fluctuations (Figure 1). Apart from this, seasonality in supply pattern generates within year price fluctuation. Both types of price movement have undesirable consequences for producer and also consumers. To overcome the phenomenon of fluctuating prices, government can intervene by arranging for a buffer stock which would be operated to counter price movements. Thus purchase of jute, for example, would be undertaken for stocking purpose when price is low due to excess supply while jute would be released in the market when price is high due to supply shortage.

EFFECT OF SUPPLY FLUCTUATION ON PRICE

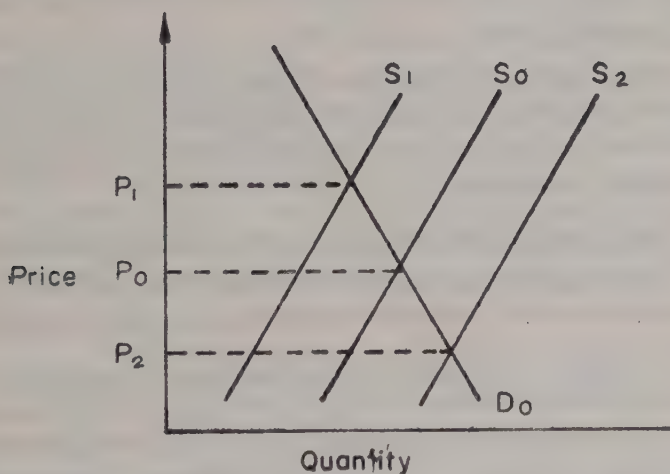


Figure 1

The desirability of price stabilisation in terms of welfare gains has been extensively discussed [12, pp. 284-98; 13, pp. 58-64; 15; 16, pp. 706-16; 17]. Controversy over desirability of price stabilisation originated with Waugh [17] who presented a theorem demonstrating that consumers would benefit from buying at fluctuating prices rather than at prices stabilised at their simple mean.

A parallel demonstration for producers was made by Oi [13, pp.58-64] who argued that under certain plausible assumptions producers would benefit from price variation. The thread of arguments presented by these authors was later picked up by Massel [12, pp. 284-98] and Samuelson [15]. While Waugh and Oi considered the interests of one party only, Massel analysed welfare implications of price stabilisation considering both producers and consumers together. He concluded that, even if one party loses through price stabilisation, total welfare would increase (i.e., price stabilisation is potentially Pareto optimal). Samuelson came up with a similar, though weaker, conclusion. He argued that price stabilisation is potentially Pareto optimal under conditions of 'stable' demand and supply. In real world however, demand and supply are subject to stochastic variability. Under this situation he could not offer any generalization pertaining to desirability of price stabilisation.

Although Massel's analysis is based on stochastic supply variability he assumed perfect knowledge on the part of suppliers. Turnovsky [16] modified his framework to incorporate the more realistic case where supplier's decision is based on anticipated price. Two expectations mechanism are considered. These are 'rational' expectations hypothesis introduced by Muth and 'adaptive' expectations hypothesis first introduced by Nerlove. The results obtained by Turnovsky are as follows :

- (1) Oi's proposition depends upon the price expectations mechanism and auto-regressive properties of stochastic disturbances. The proposition will hold provided rational expectations mechanism operates and there is autocorrelation (positive or negative).
- (2) Waugh's proposition holds under either form of expectation mechanism.
- (3) Massel's conclusion holds in both cases. The last result is very important and can be used to justify price stabilization at a theoretical level.

Of course price stabilization *per se* should not be an objective. Desirability of price stabilization even from producers point of view would depend upon variability of total proceeds and also, as in case of jute, upon whether such price fluctuations encourage a gradual shift towards substitutes. In many situations effect of price fluctuations on proceeds is offset by quantity variations. It is therefore important to analyse variations in quantity and value along with price variations.

1.3. Purpose and Design of the Present Study

The purpose of the present study is to review the nature of problem of price fluctuations of raw jute and to examine the desirability of forming an

international buffer stock of raw jute.² We consider it important to make two qualifications. First, short run price variations at the international level is related to unstable supply of raw jute exports which in its turn is due to supply fluctuations in the producing countries. Supply variations in Bangladesh (which accounts for 57.5 per cent of total world export of raw jute) exert strong influence upon world raw jute export supply. It is therefore necessary to determine the reasons behind unstable supply in Bangladesh. To some extent unstable supply of jute is due to factors beyond the control of growers, such as effect of weather on supply. Buffer stocking arrangement is primarily designed to counter the effect on price of such stochastic supply variations. But to an important extent supply fluctuations are due to economic factors. Buffer stocking arrangement should be reinforced by measures which affect these factors in a way conducive to more stable production. Second, buffer stocking arrangement needs to be examined in the context of a long run strategy towards raw jute, i.e., whether buffer stock alone can ward off the current danger for raw jute as a source of foreign exchange earnings for Bangladesh.

The paper is organised as follows. In Section II we will discuss supply of raw jute in Bangladesh. In Section III we will examine the need for an international buffer stock of raw jute in the light of fluctuations in price, quantity and value of export of raw jute from Bangladesh. This would involve firstly, as examination of the magnitude of price, quantity and value fluctuations. And second, we will need to determine the reason for price fluctuations, i.e., either demand or supply variations may cause price fluctuations and from buffer stock point of view it is supply variations which are important. Section IV will attempt to highlight some of the issues related to world jute economy and seek to lay down some suggestions for resolving the long-term problem of raw jute in Bangladesh. The last section will present some concluding observations and summarise the discussion.

II. SUPPLY OF RAW JUTE IN BANGLADESH

2.1. Acreage and Production of Raw Jute in Bangladesh

Production of raw jute in Bangladesh reveals declining trend (Appendix Table A-I). The trend growth rate calculated from production figures in 1959/60 — 1975/76 excluding 1970/71 and 1971/72, is (—) 0.58 per cent. This however does not tell the whole story. It is more relevant for our purpose to examine production trend after independence. The picture is quite depressing. Jute output

²Due to lack of adequate information we have not considered the issue of buffer stocking arrangement for jute goods.

has declined by an annual average rate of 10.5 per cent in 1975/76 over the level in 1969/70. If we consider the average rate of all over 1972/73, it is as high as 18.2 per cent. The basic reason for this alarming rate of fall in output of jute is rapid decline in acreage under cultivation. Annual rate of fall (1969/70-1975/76) is 11.3 per cent but over the level in 1972/73, rate of decline is as much as 21.1 per cent.

2.2. Supply Curve of Jute

In order to understand the reasons for fall in acreage under jute it is necessary to discuss the nature of supply curve of jute. Being an agricultural product, domestic production of jute depends very significantly upon weather conditions. Apart from that and also distracting from such factors as availability of credit and other farm inputs, relative price of jute to rice is an important factor in determining output level. Supply response is normally studied in terms of fluctuations in acreage under jute rather than output of jute. This is because farmers' decision is actually reflected in planting the crop—actual production may depend also on natural factors. We have however estimated price responsiveness on the basis of both jute acreage and output.³

Regression results of different equations are summarised in Table I. In arithmetic form the best result (in terms of R^2) is obtained from a equation where we have used the ratio of acreage under jute to acreage under rice and *aus* rice combined (Equation 2 in Table II) as the dependent variable and lagged price ratio of jute to yearly average retail price of rice as independent variable. The same equation yields the best result in logarithmic form as well (Equation 4, Table II). In general, logarithmic formulations appear to have greater explanatory power than arithmetic formulations. Short run price elasticity of acreage estimates vary from 0.481 to 0.622. Estimates of price elasticity of production vary from 0.287 to 0.48. These estimates appear to be consistent with earlier estimates obtained by other authors. For example, Rabbani [14] found short run elasticity estimates of 0.52 and 0.40 using data for Bengal (1912/13-1938/39) and

³There is one problem with official acreage data. Prior to 1965/66, jute acreage was estimated on the basis of what is known as subjective method. From 1965/66 onwards, a different method known as objective method is being followed. If we take objective method as a standard, which appears more scientific and is likely to yield better quality data, then subjective method has considerably underestimated jute acreage [2:10]. Thus the big reduction in jute acreage from 1.66 million in 1964/65 to 2.09 million in 1965/66, as shown in Table A-I is a statistical error. Output series, however, is unaffected by this switch in methodology since it is obtained independently on the basis of jute trade statistics. In view of the above limitation price responsiveness of supply is estimated on the basis of both acreage and output. Further, in case of acreage, data prior to 1965/66 have not been used.

Pakistan (1949/50-1962/63) respectively. Other studies, such as one done by Mahabub Hossain [7], have dealt with disaggregated data i.e., disaggregated at the district and regional level (Jat area, District area and Northern area). For example, short run elasticity estimates obtained by Hossain using data for the period 1952/53-1966/67 have varied from 0.29 to 0.46. Also, Northern areas seem to have higher short run price elasticity than other districts. Short run price elasticity of production obtained by a World Bank Study [9], range from, 0.28 in case of Bogra to 0.86 in case of Khulna.

TABLE I
REGRESSION RESULTS

Equation Estimated	Coefficient of Independent Variable	R ²	F	Elasticity
1. $J_t = \alpha + \beta \left(\frac{P^J}{P^R} \right)_{t-1}$	14.787* (3.11)	0.547	9.596*	0.481
2. $\left(\frac{J}{J+A} \right)_t = \alpha + \beta \left(\frac{P^J}{P^R} \right)_{t-1}$	0.151* (3.432)	0.592	11.608*	0.484
3. $\text{Log} (J_t) = \text{Log} \alpha + \beta \text{Log} \left(\frac{P^J}{P^R} \right)_{t-1}$	0.622** (4.687)	0.733	21.953**	0.622
4. $\text{Log} \left(\frac{J}{J+A_t} \right) = \text{Log} \alpha + \beta \left(\frac{P^J}{P^R} \right)_{t-1}$	0.574**	0.762	22.473**	0.574
5. $O_t^J = \alpha + \beta \left(\frac{P^J}{P^R} \right)_{t-1}$	22.628* (2.24)	0.37	8.22*	0.287
6. $\text{Log} O_t^J = \text{Log} \alpha + \beta \text{Log} \left(\frac{P^J}{P^R} \right)_{t-1}$	0.42** (3.509)	0.48	12.44*	0.42

- Notes : (1) The symbols represent the following. J and A are jute and aus rice acreage respectively. P^J and P^R denote price of jute at growers level and retail price (medium quality) rice. O^J stands for jute output.
- (2) Regressions using acreage data were run on the series from 1965/66 to 1975/76. In case of output, data from 1959/60 to 1975/76 were used. In both cases observations for 1970/71 and 1971/72 were dropped.
- (3) The terms in the bracket are 't' ratios.
- (4) Single star and double star marks indicate significant at the 95 per cent and 99 per cent respectively.

We have seen that although short run price elasticity is less than one, movement in relative price of jute *vis-a-vis* rice is an important determinant of acreage under jute and also output of jute even in the short run. The most dramatic example was obtained when due to a massive rise in price of rice relative to jute in 1973/74, acreage under jute fell by 35.47 per cent in 1974/75. Production fell by 42.07 per cent during the same time period. Fall in production had serious adverse effect on export supply. Raw jute export fell by 41.70 per cent. International price of raw jute rose from £121.0 to £185.0 (a rise of 52.89 per cent). Potentially an effective buffer stocking arrangement could have dampened fluctuations in quantity of export supply and price fluctuations to an important extent. This also demonstrates the need for a well planned domestic price policy for rice and jute in order to ensure a more stable supply of raw jute.

III. NEED FOR AN INTERNATIONAL BUFFER STOCK OF RAW JUTE

3.1. Trend Growth Rates of Bangladesh Raw Jute Export Value and Quantity

Export of raw jute from Bangladesh, both in terms of quantity and value, has fallen over time (see Appendix Table IV). Calculations of trend growth rates reveal that while export volume has fallen at an annual exponential rate of 2.788 per cent, export value has fallen at an exponential rate of 0.96 per cent. The fall in export quantity is particularly severe after independence. For example, compared to four year's pre-liberation average (1966/67-1969/70) of 625.25 thousand tons, four year's (1972/73-1975/76) post-liberation average export of raw jute is only 427.75 thousand tons. This indicates a decline of 31.59 per cent. A similar calculation for value of exports reveals a fall of 16.79 per cent.

3.2. Fluctuations in Value, Quantity and Price of Raw Jute Export from Bangladesh

Prior to discussing the nature and magnitude of raw jute export instability, some comments pertaining to the meaning of short term fluctuations and its measurement are in order. We will define short term fluctuations as deviation from the general trend. A constant rate of increase or decrease over time in export value, quantity or price is not considered as a fluctuation. Hence in measuring instability, allowance will be made for trend effect. Since there are different techniques for isolating the trend effect, it is possible to construct a number of instability indices. We will consider four indices of instability. The method of moving average provides the simplest technique for determining trend. Indices A and B (Table II) measure fluctuations as deviations from three-year moving average. Index A gives numerical value of instability in terms of relative mean deviation, while B expresses the value in terms of coefficient of

variation. Index C, which is due to Coppock [11], is a 'log variance' measure and corrects annual changes by assuming a constant percentage increase or decrease in the series. The index is the square root of the log variance of the series adjusted for trend effect. Index D uses method of least squares for measuring trend. Growth rate over time is calculated on the basis of a semi-log equation (i.e., exponential growth pattern is assumed). Numerical value of the index is reflected by the coefficient of variation.

The magnitude of instability of price, quantity and value of raw jute export from Bangladesh, calculated on the basis of indices mentioned above, are contained in Table II. Different indices, except Index C, give the same ranking. In each case the largest numerical value is obtained on the basis of Index D, while the lowest is obtained on the basis of Index A. Quantity of raw jute export show the largest fluctuation, followed by price Coppock index, while, retaining the ranking for quantity, shows value fluctuations as slightly more severe than price fluctuations.

TABLE II
INSTABILITY INDICES OF BANGLADESH RAW JUTE EXPORT

Index Code	(Figures represent percentages)		
	Price	Quantity	Value
A	9.97	12.18	8.83
B	11.79	13.61	10.97
C	12.16	13.52	12.41
D	13.23	14.24	12.52

Notes :

$$(1) A = \Sigma \left(\frac{X_t - X_t'}{X_t} \right) \times \frac{1}{N} \times 100$$

$$(2) B = \sqrt{\Sigma \frac{(X_t - X_t')^2}{N}} \times \frac{1}{\bar{X}} \times 100$$

(3) C = Anti log of the square root of the expression that follows

$$\text{Log } Z = \frac{1}{N-1} \Sigma \left[\log X_{t+1} - \log X_t - \frac{1}{N-1} \Sigma (\log X_{t+1} - \log X_t) \right]^2$$

(4) D = Coefficient of Variation calculated from deviations from exponential trend values
Thus

$$\log X_t = \alpha + \beta T, \log \hat{X}_t = \hat{\alpha} + \hat{\beta} T$$

$$\text{and } \hat{l}_t = X_t - \hat{X}_t \text{ etc.}$$

(5) Different symbols have the following meaning :

X = the variable of interest (i.e., price, quantity and value respectively),

X' = three-year moving average of X centered at the middle year,

N = number of observations,

t = time period subscript.

Estimates of price fluctuations range from 9.97 to 13.23 per cent. The magnitude of fluctuations is dampened to some extent by the operation of indicative price range arrangement which was designed to offset price fluctuations. Even then, the magnitude of price fluctuations is quite severe.

3.3. Causes of Instability of Raw Jute Export

Having established the magnitudes of price, quantity and value fluctuations it is now necessary to investigate whether supply curve shifts or demand curve shifts cause price fluctuations. This may be done by analysing the partial correlation between the three variables. If price fluctuations are caused by demand curve shifts then the correlations between price and quantity, value

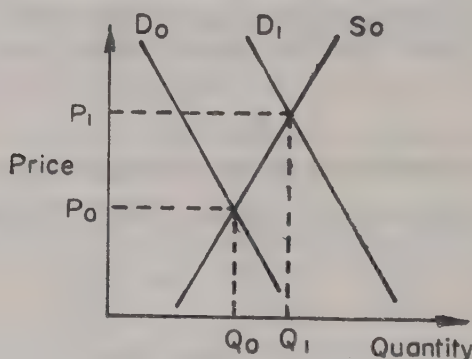


Figure 2

and quantity and value and price will all be positive (Figure 2). If supply variations cause price fluctuations the correlation between price and quantity would be negative, but the correlation between value and quantity and value and price could be either negative or positive depending upon elasticity of demand. If demand elasticity is less than unity then value and quantity fluctuations will be inversely correlated but price and value fluctuations will be positively correlated.

Table III presents estimates of the relationship between variation in price, quantity and value of raw jute export from Bangladesh. Fluctuations in value are closely, and inversely associated with fluctuations in quantity (r is 0.70 and is significant at the 95 per cent level). Variations in price and quantity are also significantly and inversely related (r is 0.62 and is significant at the 95 per cent level). Fluctuations in value and price are positively related, but the correlation coefficient is not significant.

The relationships established above have an important implication for the issue of buffer stocking arrangement. Available estimates of raw jute export supply and import demand elasticities indicate that these are less than one [8;17]. Therefore, significant inverse relationship between price and quantity fluctuations on the one hand, and value and quantity fluctuations on the other, imply that supply instability is the main cause of instability in export proceeds from raw jute. Variations in price, which we have found to be quite serious, have thus occurred mainly in response to variations in supply.

Hence the idea of an international buffer stock of raw jute appears to be an attractive proposal. In any case, Bangladesh would not lose by joining an international buffer stocking arrangement, if consumers are ready to bear their share of cost, since she already maintains a buffer stock at the domestic level. Apart from these considerations, there is a near compulsive motive induced by threat advantage that consumers have over producers. Consumers can always say that they will move out from jute manufacturing and switch over to polypropylene. Until such time as producers have the upper hand either in terms of price competitiveness and/or sufficient viable capacity to absorb production of raw jute internally, they may have to keep their customers satisfied through guaranteed supply at stable prices. Thus apart from the contribution towards stabilizing export earning from raw jute in the short run, buffer stock would also help improve the long-term prospects of raw jute through the impact of stable prices on demand stability.

TABLE III

STATISTICAL ANALYSES OF BANGLADESH RAW JUTE EXPORT FLUCTUATIONS

Estimated Equation	Coefficient of Independent Variable	R ²	F	'r' (correlation coefficient)
1. $\text{Log } V^* = \text{Log } \alpha + \beta \text{ Log } Q^*$	(—) 0.558 (3.06)	0.500	8.929	0.71
2. $\text{Log } V^* = \text{Log } \alpha + \beta \text{ Log } P^*$	(+) 0.124 (0.338)	0.012	0.109	0.11
3. $\text{Log } P^* = \text{Log } \alpha + \beta \text{ Log } Q^*$	(—) 0.422 (2.389)	0.387	5.691	0.62

Notes : (1) V, Q and P represent value, quantity and price of raw jute exports from Bangladesh.

(2) Star mark indicates that variables represent deviations from exponential trend values.

(3) Terms in the bracket represent 't' values.

(4) F and t values for equation (1) and (3) are significant at the 95 per cent level but insignificant for equation (2).

IV. A LONG RUN STRATEGY TOWARDS JUTE

4.1. World Production, Consumption and Import Demand

World production of jute and kenaf has hardly increased during the decade 1966/67 to 1975/76 (Appendix Table VI). Total production in 1975/76 was 3,840 thousand tons compared to 3,802 thousand tons in 1966/67, an increase of 0.84 per cent and is statistically insignificant. Trend growth rate in world consumption over the same period is only 0.74 per cent. World import demand trend is even more alarming for exporting countries, primarily Bangladesh. Exponential rate of decline from 1966/67 to 1975/76 is as high as 2.5 per cent annually. In absolute terms import of raw jute has declined from 1,140 thousand tons in 1966/67 to a low level of 625 thousand tons in 1975/76 indicating an average rate of fall of 6.2 per cent. The reason why consumption growth rate is positive inspite of substantial fall in imports is increased domestic consumption in the producing countries. However, consumption growth rate in jute products is also not substantial (1.8 per cent average growth rate during the period 1966/67-1975/76).

4.2. Challenge from Synthetics

The basic reason for this deteriorating condition of world jute market is competition from synthetics. "Since the mid-sixties the development of suitable synthetic substitutes gave users in consuming countries the alternative of locally produced goods at prices stable in the short run and declining in the medium run. As against this, jute goods were imported products which were not always available and whose prices were unstable and trending upwards under the impact of supply shortages and increasing costs of production. A research and development effort of considerable production was undertaken by synthetic manufacturers in developed countries and progressive quality improvements made their products acceptable to consumers. Economies of scale in production allowed synthetic producers to sell at continuously lower prices. When the battle between jute and synthetic substitutes was truly joined at the beginning of the current decade, the events in the subcontinent gave synthetic manufacturers another critical advantage. New massive investments in plants for the production of various types of synthetic substitutes for jute are now in the making, and synthetic producers strategy and expectations have changed from one of penetration into jute end-markets to one of elimination of jute from the packaging and carpet-backing scene in all the major geographical markets" [9, p.v].

Producers of synthetics were strongly supported by their governments who followed effective protection policies [9]. Imposition of tariffs and fixation of

quotas on import of raw jute and jute manufacturing swung cost advantage in favour of domestic producers of synthetics. Aided by comforting arms of tariff and quantitative restrictions, producers of jute goods in many European countries snuggled themselves into production of synthetics.

The oil crisis of the seventies appears to be a blessing in disguise for jute producing countries. During early 1974 price of polypropylene polymer rose rather sharply for the first time (Appendix Table VII). Producers however, preferred to cut down profit rather than lose market to jute. As a result, price of woven polypropylene primary carpet backing did not rise even in the face of sharp increase in cost of production while price of polypropylene cloth rose only slightly (Appendix Table VII). Continued oil price hike however appears to be worrying producers of synthetics. On the other hand demand for jute and jute products picked up slightly from the depressed levels of 1975/76 following favourable movements in price of jute and jute products relative to polypropylene polymer and its products.

4.3. Some Suggestions Pertaining to Log-run Policy Towards Jute

We have advocated for Bangladesh's participation in an international buffer stocking arrangement for raw jute. We would however emphasise that buffer stock is only a short run policy measure. Given the severe competition with synthetics, buffer stock can at best ward off complete elimination of jute from world market for sometimes to come. To check the gradual chipping off of world market it is necessary that jute producers be able to maintain the competitive level of relative price of raw jute and polypropylene polymer attained in early 1976/77. This would call for a considerable amount of tight rope walking and would require implementation of a number of policy measures.

The first important step is to ensure stable production of raw jute in the country. Two types of measures are needed. First, it is necessary to check the massive shift of acreage under jute to rice. This would involve, apart from ensuring supply of necessary inputs, provision of incentives in the form of appropriate price policy towards jute. It is not sufficient to fix floor price. It is also necessary to ensure that producers get the benefit of floor price.⁵ Second, it is very important to raise productivity. Since rice is as important a crop as

⁴This contention is made on the basis of information available in recent UNCTAD and FAO documents. See, for example, FAO [3].

⁵However, it may not be possible to increase price of jute at growers level sufficiently since this would come in conflict with the objective of maintaining competitive price level with synthetics. Therefore, rise in price of rice should be checked.

jute it may not be desirable to cut too far into acreage under rice. Adoption of new technology is the only answer to this dilemma of competing crops. Improved productivity would also be advantageous in that it would reduce average cost.

The exploitative domestic market mechanism of jute is perhaps a greater constraint on farmers earnings than supply fluctuations. Growers are exploited through systems such as *dadan*, faulty weighing procedures, lack of access to public sector purchasing centres etc. Moreover existence of a long chain of intermediaries is causing cost to increase at the level of shippers and mills and thus is making it difficult to maintain competitiveness of jute in the international market. Off hand it is tempting to say that jute trade (both external and internal) be nationalised. This may however be dangerously speculative, particularly in view of the observed inefficiency in most nationalised sectors of the country. Serious research is needed before a decision can be taken. As a first step a well designed marketing survey should immediately be undertaken.

Research should be intensified in another field i.e., development of new jute products and improvement in quality of existing products. It is also important to increase the operative efficiency of existing mills both by enhancing capacity utilisation and by reducing cost of production.

V. SUMMARY OF THE DISCUSSION AND CONCLUDING REMARKS

In this paper we have examined the issue of Bangladesh's participation in an international buffer stocking arrangement for raw jute. We have felt that, it would be advantageous to become a member of such an arrangement. Since our focus was mainly on the principle of whether to participate or not, we have not attempted to present detailed calculations and arguments pertaining to such issues as cost of maintaining a particular size of buffer stock, and composition (in respect of grades) and location of buffer stock. These are important and tricky issues and need to be carefully handled. Needless to say, success of buffer stocking arrangement would depend upon active participation and cooperation amongst the major producers and consumers both in respect of strict adherence to operational norms established and also in respect of cost sharing. A note of warning may also be added. Since price fluctuations permit speculation, private traders would see buffer stocking arrangement as contrary to their interests. Therefore vigilance has to be exercised to thwart attempts of interested parties to counter operation of buffer stock.

We have further pointed out that buffer stocking arrangement is a short run strategy. In order to retain export market over the long run, price

competitiveness of jute *vis-a-vis* synthetic has to be maintained. Some suggestions pertaining to a long run policy package for raw jute have also been made. Those concern measures for stabilizing jute production, improving productivity, overcoming internal marketing barrier and undertaking research on various aspects of raw jute and jute manufacturing designed to improve quality and reduce production cost.

Before we conclude it may also be stressed that buffer stock should not be considered as an alternative to compensatory financing schemes. Rather the two measures for stabilizing export earnings should be viewed as complementary policies. Since price stability is desirable both for short run stability of export earnings and long term impact on demand stability, situations may arise requiring a trade-off between the two objectives. In such cases it would be desirable to take a cut in export earnings and gear buffer stock operation towards the long term objective. Loss of earnings may be recouped by means of compensatory financing arrangement.

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Appendix A

TABLE I
ACREAGE AND PRODUCTION OF JUTE IN BANGLADESH

(Figures in '000 unit)

Year	Area	Production
1959/60	1375	5363
1960/61	1519	4457
1961/62	2061	6969
1962/63	1723	6300
1963/64	1700	6400
1964/65	1660	5328
1965/66	2090	6364
1966/67	2165	6400
1967/68	2354	6732
1968/69	2170	5754
1969/70	2465	7171
1970/71	2200	6670
1971/72	1676	4193
1972/73	2215	6514
1973/74	2196	6000
1974/75	1417	3476
1975/76	1277	3938

Notes and Sources :

1. Trend growth rate calculated by running the regression $\log Y = a + bt$.
2. Area and production data are obtained from [5; 6].

TABLE II
ACREAGE UNDER AUS RICE AND YEARLY AVERAGE RETAIL PRICE OF RICE
(MEDIUM QUALITY)

Year	Price (Tk./Maund)	Area (Lakh Acres)
1958/59	30.19	
1959/60	31.91	59.45
1960/61	29.30	65.00
1961/62	30.21	58.74
1962/63	32.28	61.92
1963/64	28.93	65.86
1964/65	30.07	66.45
1965/66	36.00	73.21
1966/67	45.90	69.65
1967/68	44.32	82.21
1968/69	46.23	76.58
1969/70	57.20	84.62
1972/73	89.60	72.41
1973/74	120.50	76.81
1974/75	244.40	78.57
1975/76	153.90	84.52

Notes and Sources :

1. Rice price is yearly average of four centres (Dacca, Khulna, Rajshahi and Chittagong).
2. Data obtained from [1].

TABLE III
MONTHLY WEIGHTED AVERAGE PRICES OF RAW JUTE AT GROWER'S LEVEL WHITE AND TOSSA COMBINED
PRICE IN TK. PER MAUND

Year	July	August	September	October	November	December	January	February	March	April	May	June	Annual Average (weighted)
1958/59	19.00	19.00	16.44	15.56	14.44	14.75	15.44	14.81	15.06	16.88	17.56	16.62	16.00
1959/60	19.63	20.33	18.81	17.25	19.44	32.06	23.50	21.93	23.81	26.40	35.78	35.09	20.90
1960/61	31.03	30.79	34.85	53.41	59.85	54.60	62.06	69.52	69.14	52.25	59.80	47.93	47.94
1961/62	45.37	30.96	27.87	25.62	22.92	23.86	21.62	20.23	20.41	18.59	16.76	16.06	24.88
1962/63	19.04	17.99	19.17	23.39	24.27	22.35	24.01	23.10	22.74	22.51	22.69	22.85	21.95
1963/64	23.16	21.68	21.98	22.48	21.75	22.32	22.50	22.71	22.86	22.88	22.89	22.91	22.52
1964/65	24.86	35.96	35.26	33.23	31.55	32.53	31.32	29.69	26.92	30.82	33.06	32.23	31.47
1965/66	28.85	26.41	23.58	22.14	22.87	25.71	32.10	39.10	38.12	39.19	40.14	38.57	27.39
1966/67	36.57	36.42	34.55	34.38	36.76	39.23	39.33	37.89	35.34	33.64	32.93	32.29	36.03
1967/68	28.85	27.60	27.18	27.59	27.66	27.61	27.67	27.50	27.40	27.74	27.72	28.68	27.58
1968/69	28.96	30.91	32.12	36.62	39.56	38.69	38.07	36.47	34.87	35.29	34.35	31.88	34.01
1969/70	28.69	29.03	28.35	28.71	29.67	30.35	30.01	31.10	32.67	34.16	35.05	33.16	29.78
1970/71	33.47	34.93	34.91	34.71	35.66	35.90	37.39	38.10	n. a.	n. a.	34.00	33.87	35.15
1971/72	34.72	36.18	35.40	35.14	35.41	n. a.	38.55	43.18	45.84	49.50	51.62	51.47	38.80
1972/73	50.47	44.73	48.25	50.94	52.48	54.29	54.52	55.10	55.33	56.37	55.72	55.77	52.58
1973/74	50.94	52.44	51.70	52.54	52.64	52.90	53.64	54.80	56.31	57.52	61.12	67.32	52.81
1974/75	66.17	67.39	85.76	107.48	127.62	106.80	94.09	83.06	81.77	80.52	83.31	87.33	86.08
1975/76	88.90	87.78	90.51	88.24	87.02	90.23	99.36						90.29

Source : [5 ; 6] .

TABLE IV
EXPORT OF RAW JUTE FROM BANGLADESH

Year	Quantity (‘000 tons)	Index (1966/67=100)	Value (ml. £)	Index (1966/67=100)
1966/67	613	100	69.88	100
1967/68	668	108.97	70.14	100.37
1968/69	585	95.43	73.12	104.64
1969/70	635	103.59	73.66	105.41
1970/71	415	67.70	48.14	68.89
1971/72	461	75.20	64.08	91.70
1972/73	509	83.03	58.54	83.77
1973/74	482	78.63	58.32	83.46
1974/75	281	45.84	51.96	74.36
1975/76	439	71.62	69.80	99.89

Notes : (1) Trend growth rates calculated from the equation $\log Y = a + bt$.

(2) Quantity series obtained from [4].

(3) Value series derived from price and quantity series.

TABLE V
INTERNATIONAL PRICE OF RAW JUTE (F.O.B) (BANGLADESH, WHITE/D)

Year	£per ton	Index (1966/67=100)
1966/67	114.0	100.00
1967/68	105.0	92.10
1968/69	125.0	109.65
1969/70	116.0	101.75
1970/71	116.0	101.75
1971/72	139.0	121.93
1972/73	115.0	100.87
1973/74	121.0	106.14
1974/75	185.0	162.28
1975/76	159.0	139.47

Source : [4].

TABLE VI

WORLD PRODUCTION, CONSUMPTION AND IMPORT OF RAW JUTE AND KENAF

(in '000 tons)

Year	Total Production (1)	Beginning Stock (2)	Changes in Stock (3)	Total Supply (1+2)	Total Consumption (1-4)	Imports
1966/67	3802	566	284	4368	3518	1140
1967/68	3743	850	28	4593	3715	959
1968/69	2661	878	(-) 473	3539	3134	911
1969/70	3673	405	34	4078	3639	930
1970/71	3406	439	263	3845	3143	745
1971/72	3280	702	(-) 176	3982	3456	736
1972/73	3911	526	150	4437	3761	788
1973/74	4563	676	630	5239	3933	805
1974/75	3771	1306	(-) 279	5077	4050	626
1975/76	3840	1027		4867		625

Notes and Sources : (1) Trend growth rates calculated on the basis of the equation $\log Y = a + bt$

(2) Data obtained from [4].

TABLE VII

MOVEMENT IN PRICE OF SYNTHETICS COMPETING WITH JUTE

Year	Polypropylene Polymer (Western Europe c.i.f. price) US \$ per Ton	Woven Polypropylene Carpet Backing (US price) Cents per Sq. Yd.	Polypropylene Cloth (36" x 9") (ex-mill) Cents per Sq. Yd.
1968	400.0	18.0	16.0
1969	385.0	18.0	13.8
1970	425.0	17.0	10.8
1971	385.0	16.0	10.8
1972	385.0	18.0	11.8
1973	385.0	18.0	12.0
1974	410.0	18.0	12.6
1975	625.0	18.0	13.6
1976	590.0	18.0	14.6

Source : FAO [3].

Money Demand Functions : Some Specification Issues Analyzed by International Comparisons

by

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AND

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This article estimates demand for money function in twenty-six countries. The estimates are compared to results of other authors. Using rank correlations, the models are analyzed across countries to examine the general applicability of a demand for money function. Our conclusion is that there is no commonly applicable demand for money function.

I. INTRODUCTION

The demand for money is an issue of continuing interest to economists. Empirical investigation of it with a variety of models has led to few, if any, concrete conclusions. In spite of using different functional forms, different independent and dependent variables and a large variety of estimation techniques, no generally accepted theory has arisen from the continuing stream of empirical studies. The reader is referred to any bibliographical source for verification of this statement (e.g., [4]).

This paper estimates a variety of models for twenty-six (almost randomly chosen) countries in an attempt to determine, by international comparison, the adequacy of the most popular specifications for explaining the demand for money in an inflationary environment. Up till now studies of using different models have been confined to U.S. economy.

II. TWO MODELS OF THE DEMAND FOR MONEY WITH VARIATIONS

The two standard models of the demand for money which we shall investigate are :

$$1. \ln m_t^* = a_1 + a_2 \ln y_t + a_3 \ln r_t$$

$$\ln m_t - \ln m_{t-1} = \gamma (\ln m_t^* - \ln m_{t-1})$$

and

$$\begin{aligned} 2. \quad \ln m^*_t &= a_1 + a_2 \ln y_t + a_3 \ln r_t + a_4 \ln P^*_t \\ \ln m_t - \ln m_{t-1} &= \gamma (\ln m^*_t - \ln m_{t-1}) \\ \ln P^*_t &= \sum \omega_i P_{t-i} \end{aligned}$$

Whereas, m = demand for money

y = national income

r = rate of interest

p = price level

t refers to time subscripts and $*$ to expected values.

Where all variables (except P) are in real terms. These two models will be estimated with two different concepts of Y_t : GNP and GNE. The GNP is the most widely used concept of income in the previous studies. GNE which equals GNP plus imports and minus exports ($GNE = GNP - \text{EXPORTS} + \text{IMPORTS}$) was first suggested by Fisher [2], and is felt by some authors to be the more appropriate variable to use in an open economy. Be that as it may, the four models we shall be most concerned with in their reduced forms are :

- I. $\ln m_t = \gamma a_1 + \gamma a_2 \ln GNP/P + \gamma a_3 \ln r_t + (1 - \gamma) \ln m_{t-1}$
- II. $\ln m_t = \gamma a_1 + \gamma a_2 \ln GNE/P + \gamma a_3 \ln r_t + (1 - \gamma) \ln m_{t-1}$
- III. $\ln m_t = \gamma a_1 + \gamma a_2 \ln GNP/P + \gamma a_3 \ln r_t + (1 - \gamma) \ln m_{t-1} + a_4 \ln p^*_t$
- IV. $\ln m_t = \gamma a_1 + \gamma a_2 \ln GNE/P + \gamma a_3 \ln r_t + (1 - \gamma) \ln m_{t-1} + a_4 \ln p^*_t$

It may be noted at this point that most authors impose the restrictions that $0 < \gamma < 1$. If $\gamma > 1$, the model is one of over adjustment which is usually thought unreasonable. Dennis R. Starleaf [5], in an important criticism of the models analyzed here has pointed out that the adjustment mechanism used here has some rather unsatisfying implications. Of most interest is :

$$\frac{d \ln m^*_t}{d \ln m_t} = \frac{1}{\gamma}$$

This means that the demand for money is an over adjustment mechanism not a partial adjustment. This makes sense only if the supply of money is demand determined. Thus, we are implicitly making this assumption also. It will be noted later that γ , in many countries strays above one. This gives support of Starleaf's argument that adjustment mechanism is mis-specified. General suggestions have been made for re-specification of this equation some of which we are now investigating but have not included here.

III. THE DATA AND ESTIMATION TECHNIQUE

The data used in this analysis are yearly data on twenty-six countries. These are taken from various issues of *International Financial Statistics*.¹

¹The data were assembled for another project by Professor Gail Makinen of Wayne State University, who has graciously permitted us to use them.

We have used money narrowly defined—currency plus demand deposits, the short-term interest rate, and the consumer price index. The precise definition of the price index and interest rate may vary from country to country.

The price estimation (P^*_t) is a distributed lag in previous prices :

$$p^*_t = \sum_{i=1}^n w_i \ln p_{t-i}$$

The estimation technique is Professor Raj Jain's generalized Almon lag [3]. That is,

$$\omega_1 = \alpha_0 + \alpha_1 \lambda^1 + \alpha_2 \lambda^2_1 + \alpha_3 \lambda^3_1 + \alpha_4 \lambda^4_1.$$

This lag distribution is much more flexible than has been previously used in studies of money demand.

IV. EMPIRICAL RESULTS

In Table I, the result for several of the countries in our sample are displayed along with a catalogue of results prepared by Fase and Kure [1, pp. 410-49]. Specific reference to the articles may be found in the bibliography to his paper. Displayed in this fashion not much is readily apparent. That is one has a "you can't see the forest for the trees" situation. Thus we have not displayed the individual values for the seventeen countries Fase and Kure's sample. Some of the values from this countries are displayed in Table II. Fase and Kure's conclusion that the income elasticities are smaller than unity and interest rate elasticities vary among the countries are generally confirmed by our results both in the countries displayed and in the entire sample. It is apparent from our results that GNP—income elasticity is continuously higher than GNE elasticity. This happens both with and without price expectations.

Table II presents some statistics of interest for each of the 26 countries—some values are missing for a variety of important reasons, these appear as 0.0 in the table. These statistics were subjected to further analysis by computing rank correlations between each of them and the rate of growth in prices over the sample period. (This was approximated by $\Delta \ln P$.) The results are presented in Table III. It will be noted immediately that hardly anything in Table III is significant. This is Partly explained by the fact that rank correlations are of very low power. That is they have a very high probability of accepting erroneously (Type II error in statistical jargon). However, since the statistics are based on different sample sizes, they cannot be transformed into statistics which conform to the assumptions of more powerful procedures such as Analysis of Variance. Therefore, less powerful, non-parametric tests may be used. Hence

TABLE I

Country	Author	Period of Observation	Concept of Money	Income Variable	Interest Rate	Income Elasticity	Interest Elasticity
Australia	Juttner & Tuckwell Gomes & Ryan	1952:I-1972:III	Broad	GNP	Short	0.80-1.010	-0.17
		1951-1972	Narrow	GNP	Short	0.114	-0.003
Austria	Furst <i>et al.</i> Gomes & Ryan	1954:I-1966:IV 1950-1972	Narrow Narrow	GNE	Short	0.099	-0.070
				GNP*	Short	0.626	-0.221
				GNE*	Short	0.258	-0.102
				GNP	Long	0.910-0.96	-0.18
				GNP	Short	0.848	-0.176
				GNE	Short	0.559	-0.074
				GNP*	Short	-0.160	-0.267
				GNE*	Short	0.219	-0.253
Belgium	IMF Villanueva Gomes & Ryan	Not reported 1957:I-1969:IV 1953-1971	Narrow Narrow Narrow	Ind. Prod.	Short	0.850	-0.09
				GNP	Short	0.750	-0.04
				GNP	Short	0.784	-0.029
				GNE	Short	0.559	-0.052
				GNP*	Short	0.332	-0.033
				GNE*	Short	0.246	-0.038
	Hamburger Roskamp & Laumas Konig	1963:I-1970:IV 1953:I-1965:IV	Narrow Narrow	GNP	Short	0.930	-0.09
				GNP	Short	1.020	-0.07
	Mattfeldt	1957:I-1966:IV 1950:I-1967:I	Narrow DD	GNP	Short	0.960-0.980	-0.15
				GNP	Short	1.020	-0.18
	Westphal Gomes & Ryan	1959:I-1967:IV 1950-1972	Narrow Narrow	GNP	Short	0.990-1.050	-0.10-0.120
				GNP	Short	0.969	0.077
				GNE	Short	0.316	-0.049
				GNP*	Short	0.098	-0.004

(Contd.)

TABLE I (Contd.)

Country	Author	Period of Observation	Concept of Money	Income Variable	Interest Rate	Income Elasticity	Interest Elasticity
Finland	Leoponiemi	1952:I—1962:I	Broad	GNE*	Short	0.189	-0.004
				GDP	None	1.190	n.a.
	Gomes & Ryan	1950—1972		GNP	Short	0.555	-.024
				GNE	Short	0.259	-.031
Italy				GNP*	n.a.	n.a.	n.a.
	Cotula	1958:I—1967:IV	Deposits	GNE*	Short	0.024	-.545
	Villanueva	1958:I—1971:I	Narrow	Brute Nat. Income	Short	0.800	
	Gomes & Ryan	1951—1972	Narrow	GNE	Short	1.010	-.34
France				GNP	Short	1.440	.531
				GNE	Short	0.045	-.073
				GNP*	Short	0.795	-.0009
				GNE*	Short	0.531	-.066
	Grandmount	1960:I—1971:IV	Narrow	GDP	n.a.	1.190	n.a.
	Melitz	1959:I—1970:IV	Narrow	GDP	Long	0.650	-.21
	Gomes & Ryan	1951—1972	Narrow	GNP	Short	1.120	-.495
				GNE	Short	1.494	-.329
Netherlands	Dierick	1951:I—1966:IV		GNP*	Short	0.214	-.099
				GNE*	Short	0.244	-.110
	Fase & Kune	1952:I—1971:IV	Broad	Net. Nat. Income	Long	1.000	-.017
	Gome & Ryan	1950—1972	Broad	GNE	Long	0.800	-.16
				GNP	Short	0.691	-.061
				GNE	Short	0.599	-.069
				GNP*	Short	0.559	-.047
				GNE*	Short	0.167	-.055
Switzerland	Schelbert-Syfrig	1947:I—1963:II	Narrow	NNP	Short	0.860	-.18
	Gomes & Ryan	1950—1972	Narrow	GNP	Short	0.957	-.043
				GNE	Short	0.379	-.075
				GNP*	Short	0.397	-.081
				GNE*	Short	0.347	-.090

TABLE II

Country	Elasticities				R-Squares			
	GNP/P	GNE/P	GNP/P (with P*)	GNE/P (with P*)	GNP/P	GNE/P	GNP/P (with P*)	GNE/P (with P*)
Australia	0.1140	0.0990	0.6260	0.2580	0.7300	0.7700	0.9800	0.9700
Austria	0.8480	0.5590	-0.0160	0.2190	0.9900	0.9800	0.0	0.9900
Belgium	0.7840	0.5330	0.3320	0.2460	0.9800	0.9900	0.9900	0.9900
Brazil	0.5290	0.1690	0.6650	0.1320	0.8900	0.8800	0.9800	0.9800
Chile	0.4200	0.6400	-0.7770	-0.7940	0.9200	0.9200	0.9800	0.9800
China	1.3200	1.0400	1.5300	0.7400	0.9900	0.9900	0.9900	0.9900
Columbia	1.4200	0.8000	-0.1360	-0.2170	0.9800	0.9800	0.9900	0.9900
Costarica	1.1400	0.1960	-0.7560	-0.3240	0.9800	0.9800	0.9900	0.9900
Denmark	0.8570	0.4860	0.2700	0.1810	0.9600	0.9800	0.9900	0.9900
Finland	0.5550	0.2590	0.0	0.0240	0.9000	0.9100	0.0	0.9900
France	1.1200	0.4940	0.2140	0.2440	0.9800	0.9800	0.9900	0.9900
Germany	0.9690	0.3160	0.0980	0.1890	0.9900	0.9900	0.9900	0.9900
Greece	1.3000	0.4260	-0.0160	0.0930	0.9900	0.0	1.0000	1.0000
Honduras	0.6470	0.2440	1.1450	0.8000	0.9400	0.9400	0.9900	0.9900
Ireland	0.2700	1.2300	0.6330	-0.1060	0.2000	0.3700	0.9900	0.9900
Italy	0.4400	0.0450	0.7950	0.5310	0.9900	0.0	0.9900	0.9900

(Contd.)

TABLE II (Contd.)

Country	Lambdas		Gammas			$\Delta \log P$
	GNP/P	GNE/P (with P*)	GNP/P	GNE/P	GNE/P (with P*)	
Australia	0.8000	0.9000	0.5174	0.2080	0.9000	1.4700
Austria	0.9000	0.9000	0.9877	0.6470	0.7800	0.0
Belgium	0.6000	0.5000	1.1417	0.5962	0.6500	0.4800
Brazil	0.7000	0.7000	0.8676	0.3970	1.0300	1.1000
Chile	0.8000	0.8000	0.1979	0.3343	0.9700	0.9980
China	0.4000	0.3000	0.9834	0.7148	1.6400	0.7330
Columbia	0.8000	0.8000	1.0354	0.6024	1.0200	1.0050
Costarica	0.9000	0.9000	1.0062	0.1000	1.1400	0.8700
Denmark	0.8000	0.8000	0.9658	0.3958	1.0900	1.1300
Finland	0.8000	0.9000	0.9514	0.4461	0.0	1.2900
France	0.9000	0.9000	1.1716	0.4439	1.0900	0.9300
Germany	0.9000	0.9000	1.2712	0.3472	1.0900	1.2300
Greece	0.9000	0.9000	0.5044	0.3693	1.1800	1.2300
Honduras	0.9000	0.9000	0.5122	0.4565	1.3300	1.6000
Ireland	0.3000	0.3000	1.2130	1.2385	1.0700	1.1300
Italy	0.9000	0.9000	0.0011	0.0225	1.2600	1.5400
Jamaica	0.7000	0.7000	0.2020	0.1895	1.0500	0.8900
Japan	0.9000	0.8000	0.4270	0.3968	0.7000	0.6400
Korea	0.2000	0.2000	0.4631	0.4683	1.7700	1.9900
New Zealand	0.5000	0.4000	0.2213	0.1951	-0.0100	0.0
Netherlands	0.9000	0.3000	0.7309	0.8049	1.1900	0.2500
Philippines	0.5000	0.9000	0.8105	0.8668	0.4700	0.2700
Portugal	0.6000	0.9000	0.1085	2.2619	0.6100	0.7000
South Africa	0.7000	0.6000	0.2810	0.3707	0.6400	0.6700
Spain	0.4000	0.4000	0.9096	0.7849	0.2000	0.1800
Switzerland	0.9000	0.9000	0.3003	0.2867	0.1500	0.0200

a correlation being statistically insignificant should not be considered important.

It was expected that the income elasticity would not have a significant correlation with inflation. That is, we anticipated that the elasticity of demand for real balances with respect to real income would not vary with the rate of inflation. This is confirmed by the very low rank correlations in all models, though there does seem to be a tendency towards small positive values.

We hypothesized that R-squares would rank negatively with rates of inflation. This is because, in our opinion, the "real" models would be less valid in a country with a high rate of price growth than in a country with a low rate. This was not only confirmed in all models, but in spite of the low power of the test, was significant in the GNE/P model without price expectations (Model II). It is interesting that the simplest model we tried (GNP/P, without price expectations) held together the best. That is the correlation between low R²'s and high inflation was smallest (in absolute value) in this model.

Since the number of periods necessary for price expectations to adjust is approximated by $1/\lambda$, a higher lambda (less than one) implies a faster adjustment. Thus it was expected that the higher the rate of growth in prices, the higher would be the lambda, giving a positive sign to the rank correlations. It will be noted that they have a negative sign but one very small in absolute value.

Gamma is similar to lambda in that its inverse indicates the speed of adjustment to desired levels of real balances. The rank correlation has the expected sign—i.e., positive, implying the quicker the adjustment the higher the rate of growth in prices—in all four models. Further, the GNE/P models (II and IV) do better, if one believes the rank correlation should be positive, with Model IV even achieving significance. This provides some support for using GNE/P in an inflationary environment. When price expectations are included, λ is greater

TABLE III

		I	II	III	IV
Income	C—K— γ	-.0130	.1342	.1429	.1169
	τ_B	-.0130	.1342	.1429	.1169
Elasticity	ρ	-.0536	.1948	.1801	.1361
	C—K— γ	-.2600	-.3723	-.5733	-.5325
R ²	τ_B	-.2419	-.3359*	-.3267	-.3074
	ρ	-.3354	-.4418*	-.4080	-.3946
	G—K— γ			-.1313	-.1250
λ	τ_B			-.1216	-.1140
	ρ			-.1782	-.1325
	G—K— γ	.0585	.1385	.2193	.3217
γ	τ_B	.0585	.1385	.2179	.3210*
	ρ	.0762	.2274	.3273	.4846*
	Coeff.	.2796	.3567	.2152	.2143
Con-Cord- ance	F	1.1643	1.6634	1.0965	1.0907
	Sig.	.3018	.0565	.3646	.2690

G—K— γ → Goodman—Kruskal gamma statistic
 τ_B → Kendall's tau—B statistic
 ρ → Spearman's rho statistic
 * → Significant at .05 level, Note: no significant levels have been computed for G—K— γ .

than one in 14 out of 25 countries when GNP is used and 12 out of 25 countries when GNE is used. In addition λ is negative in one country when GNP/P is used. Since the model implies that λ is between zero and one, this lends evidence to arguments such as Starleaf's [5] that the adjustment mechanism used here is mis-specified. Without prices, λ is outside the acceptable range in only 6 of the 26 countries in the GNP/P model and only twice in the GNE/P model (and one of these, Portugal, is so horrendous we suspect it is a mistake).

The concordance co-efficients measure the agreement of the rankings for each model taken as a whole. They are based on the squared deviations about the mean ranking. The null hypothesis is that there is no agreement among the rankings of each model. While none of the tests reject that hypothesis, the co-efficient for GNE/P without price expectations seems the best, and, in general, the models without price expectations are better in this sense than those with.

As a final note, on the empirical results, it is interesting to observe that this distributed lag estimation model allows the lag distribution to take on a variety of shapes. The lags in the countries we estimated have the following general shapes :

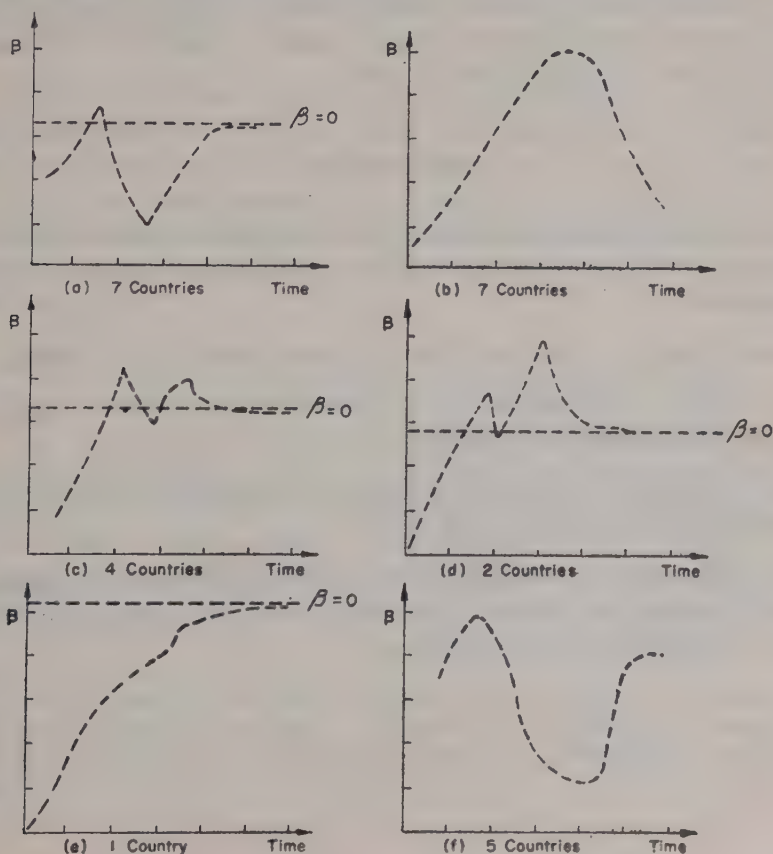


Figure 1

With shapes generally being similar for both GNP and GNE. Classifying the countries on the basis of characteristics of these shapes (number of peaks, cyclic/non-cyclic), we tried a discriminant analysis to determine if asset of variables could be found which would assign a lag distribution to a country. The results were generally inconclusive, although we found some evidence that a cyclic distribution, such as Figure IF, is distinguishable. Although no previous work has been done along this line, we feel further investigation may prove fruitful.

V. CONCLUSION

Our conclusions are highly skeptical. In spite of the great deal of empirical work that has been done, there is nothing in this analysis which indicates to us that any model of the demand for money is in any sense better than any other. If there is an economic truth underlying the demand for money, that is if there is some kernel of wisdom which holds for any and all countries, it has not shown itself in this analysis and we doubt if it has been found in any research. Thus, we feel that much research remains to be done on the theory of the demand for money and that in the great volume of empirical work that has been done there is less than meets the eye.

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Measurement of Rural Unemployment : A Disaggregative Approach

by

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I. INTRODUCTION

This note attempts to show that the aggregative application of the existing methods of measuring unemployment is not adequate to analyse rural unemployment situation. It is argued that the structure of the labour market must be taken into account in measuring unemployment. Currently used aggregative measures should be disaggregated on the basis of such structure. The data obtained from the study of a village in Barisal, will be extensively used to illustrate the argument.

Section II introduces the commonly used measures and tries to bring out their inadequacies while emphasizing the need for a disaggregative approach. Section III explains the nature of the data used for the study. Section IV shows how a measure of rural unemployment can take care of the seasonality problem. Section V discusses the nature of unemployment in the village under study by taking into account the structure of the labour market. The main findings are summarised in the last section.

II. THE MEASURES OF UNEMPLOYMENT

The census method of measuring unemployment is rejected due to their extremely simplistic approach in the face of the complexity of the issue of rural unemployment. The collection of information on whether one seeks a job (willingness criterion) or whether one is gainfully employed for a number of days a year (time criterion) is not enough to ensure listing of all unemployed when the presence of disguised unemployment or under-employment is recognised. In

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view of the existence of such problems, other methods have been suggested to estimate rural unemployment. The commonly used ones are :

- a. Surplus labour approach
- b. Productivity approach
- c. Recognition approach
- d. Income approach
- e. Income-time combination.

The inadequacies of these measures arising from conceptual problems or problems of practical application have been pointed out from time to time [5;7; 9; 10; 11; 13]. In addition, use of different methods may give confusingly different results. For Bangladesh the following estimates of rural unemployment are obtained.

TABLE I
VARIOUS ESTIMATES OF AGRICULTURAL RURAL UNEMPLOYMENT
IN BANGLADESH

Source	Method Used	Percentage of Unemployed		
		1964/6	1969/70	51974
Stern, J.J.	Surplus Labour*	30.8	32.4	
FAO	Not Available	32.5	32.5	35.6
Muqtada, M.	Surplus Labour*		39.8	35.7
Rabbani, M.G.	Productivity**			
	Criterion	40.0		
BIDS Survey	Time Criterion***			28.0

Source : [3].

Notes : *This surplus labour method calculates the difference between supply of labour and the estimated demand for it.

**Excess labour force over the level that equals the marginal productivity of labour of wage was estimated.

***Those who worked for less than 290 days were taken as unemployed.

The results are different by 9% in some cases. The trends are also shown to be opposite (compare FAO's and Muqtada's results). So, it is difficult to use these estimates as guide for policy formulations.

But the other aspect of the problem is that each of these measures takes the labour force as a whole as the target to which it is to be applied. But the rural is not a homogeneous group as they may be engaged in different types of work, supervisory or physical, or in different occupations and in various roles in the production organisation within an occupation. Unemployment for different groups and at different parts of the year may be of different types and due to different

reasons. The above measures do not take care of these aspects. Also, they will be of limited use to suggest policy measures as they do not throw any light on the reasons as to why such unemployment prevails and among which group of rural labour.

In view of these problems there is a need to change the approach to the problem of rural unemployment, for a better understanding and measurement. The approach should take into account the problem of seasonality in unemployment and reasons behind unemployment among different groups of the labour force. The application of the methods mentioned above can help us, if we use them in a disaggregative manner. For example, the surplus labour method could be used to measure the surplus in each month or the time or income criterion could enumerate the unemployed among wage workers and the self employed persons separately. How this could be done, is discussed in the Sections IV and V.

III. DATA AND METHODOLOGY

The data for this note is taken from an intensive village survey. As the information pertains to only one village, we shall not attempt any generalisation. Our intention is mainly to analyse the usefulness of a disaggregative approach to the problem of unemployment and the data are used simply to illustrate such usefulness. The information relates to the year 1973/74.

To bring out aspects of employment and unemployment, we had to collect information on details of employment of all working members, their income and occupation. In the work force we included everyone who worked either part-time or full-time. In the study village the labour market is casual and not of a permanent type. Anyone willing to work can keep himself employed for at least a few days. So, a person within the labour force aged 12 years and above, who remained without work during the whole of the year was excluded from the work force and was identified as voluntarily unemployed. Direct interview of such unemployed also confirmed the fact. The excluded persons come mainly from richer sections, adults, when there are surplus family labour for supervisory work and youth who engage in full-time studies. But students who have reported for some part of the year (when necessary, as they claimed) are included as member of work force.¹ For the working force we collected data on days worked during each month of the year separately, disaggregated by occupation, mode (whether self-employed or wage employed) and place of work. Monthly data were collected on the basis of memory. Though some memory lapses may remain, the

¹This may exaggerate, the extent of under-employment to some extent, but as their percentage in the total work force is very small, this will not distort the picture significantly.

data obtained have workable reliability. A further point may be added that the pattern of unemployment rate and the structure is comparable to other studies, based on both memory data [8] as well as data based on weekly or fortnightly interview over the whole year [4;6].

IV. SEASONALITY AND MEASUREMENT OF UNEMPLOYMENT

In the surplus labour method to measure demand for labour a simple coefficient of total labour required per acre is used. But it is obvious that one man-day applied in the slack season is not a substitute for one man-day in peak season. Everyone is aware of the seasonal cropping pattern of our agriculture which generates a heavy demand for labour during the peak season but keeps substantial labour idle during the slack season [4; 5]. Therefore to retain the usefulness of the surplus measurement approach, it has to be extended using the labour requirement index for each month and calculating the surplus separately.

In the village concerned the number of working persons is 272. If we assume a 25 day man-month, then 6,590 man-days can be worked in a month. From Table II we find that during 'Ashar' (June-July) month maximum number of days were worked (more than 25 days per worker). It may be pointed out that, the

TABLE II
SEASONAL EMLPOYMENT PATTERN IN A BANGLADESH VILLAGE

Month	Total Days Worked		Total Days Not Worked (Asharted days being maximum days that could be worked)		Working Hours per Day
	All Occupations	Agriculture	Days	% of 6,692 Days	
'Baishakh'	5462	1872	1230	18.38	6
'Jaistha'	5316	2496	1376	20.56	7
'Ashar'	6692	4804	0	0	10
'Sraban'	6611	4786	81	1.21	10
'Bhadra'	4785	2665	1907	28.49	9
'Aswin'	2973	526	3119	46.60	5
'Kartik'	5044	3181	1648	24.62	5
'Agrahyan'	6256	4667	438	6.54	12
'Poush'	5769	3239	923	13.79	6
'Magh'	5799	2811	893	13.34	6
'Falgun'	4774	1791	2918	43.60	6
'Chaitra'	4200	1243	2492	37.23	6

'Baishakh'=16 April to 15 May approximately.

Jaistha=16 May to 15 June approximately etc.

possibility of work-sharing or low intensity of work is unlikely in this month, since on the average 10 hours are worked daily. Taking this 6,692 days to be the total supply, unemployment over months are calculated. The seasonal nature of the demand for labour in rural areas is clear from Table II. The seasonality is more acute if we consider agriculture alone. The very pronounced nature of the peak and slack period is due to the overwhelming importance of only one crop—*aman*, *aus* and jute are not very significant here. Otherwise employment situation during 'Chaitra' and 'Baisakh' would be slightly better but the slack of 'Aswin' would remain as it is. Seasonality will be more pronounced if we consider the fact that off season man-days are not full-days, when only small hours are worked (see Table II).

At this micro level it has been possible to collect monthly data on days worked. But this may not be possible at the aggregate level. In that case, a separate coefficient of labour requirement will have to be used for each month. The above discussion and micro level studies are helpful in that they can suggest the exact nature of seasonality and the coefficients to be used, as against totalling seasonal unemployment over the year [2].

V. UNEMPLOYMENT AMONG DIFFERENT CATAGORIES OF WORKERS

The arrangements under which a person works, influence much of his motivation, attitude towards employment, and hence the total days worked during the year and income. We may broadly classify the workers into three types on the basis of arrangements under which they work.

(a) Purely wage labourer : They work only for others against wage payments. In Bangladesh most of them are employed on a daily basis. In the village under study only a few were found to be employed on a permanent basis.

(b) Self-employed : This group includes the family members working on family farm, sharing the family income and receiving no wages.

TABLE III
INCOME AND EMPLOYMENT POSITION OF TYPES OF WORKERS, 1973/74

Types of Workers	Number in Classes	Mean Income	Median Income	Average Number of Days Worked
Self-employed Workers	97	5125	4182	236
Wage Labourers	62	2469	1792	238
Partly Self-employed and Partly Wage Labourers	113	3249	2900	241

(c) The third group consists of persons who are self-employed for a part of the year and work for wages during other times. As mentioned earlier, to be more useful for policy guidance, employment problem of these groups should be treated separately, since the reasons for their unemployment may be different. The unemployment position of these three groups of households can be seen from Table III.

One can note from Table III that an employed person worked on average for nearly 240 days during the year. If on the basis of this criterion we take 300 days as full employment² then it is evident that an average worker in the village remained unemployed for 20 per cent of the time during the year. Very little difference in unemployment rate was found among the three types of workers.

If, however, one looks at the distribution of workers by the number of days worked one can notice important differences (see Table IV). About 30 per cent of the workers among those who work entirely for others remained unemployed for about more than 33 per cent of their time. But among self-employed they were about 34 per cent. The percentage of fully employed was, however, higher among the latter category. The fully employed were 31 per cent among the self-employed category, but only 24 per cent among the wage labourers, and 20 per cent among those who work partly for other and partly for himself.

TABLE IV
DISTRIBUTION OF WORKERS BY NUMBER OF DAYS WORKED

Days Worked	Under-employment Rate (time criterion)	Percentage of Workers		
		Self- employed	Wage Labourers	Partly Self- employed and Partly Wage Labourers
Less than 150	More than 50%	14.5	12.9	11.6
150 to 200	33 to 50%	19.6	17.8	15.9
200 to 250	17 to 33%	22.7	17.8	26.6
250 to 300	up to 17%	12.4	27.4	25.7
300 and Over	Fully-employed	30.8	24.0	20.4

²There is no standard norm of the number of days of work on the basis of which a person could be defined as fully employed. If one takes the Western concept of 5 days of work in a week, it should be 260 days. In Bangladesh, however, it is found that many people work for seven days a week. We have taken 300 days as the limit, on the basis of 6 working days in a week and 13 days of casual leave.

An important consideration which received attention in the recent literature on un- and under-employment is the terms of employment. It is argued that a person may remain fully employed on the basis of the time criterion yet may not earn enough to maintain a minimum level of living because of poor terms of employment. Such a person should be defined as poverty unemployed.

Tables IV and V give a picture of the income position of the three categories of workers.³ One can note from Table III that although the average number of days worked are almost the same, the average income received by the self-employed is more than twice that of the wage workers. The difference is more sharp if one considers the median income of each group.⁴ The median income of the self-employed group is 2.3 times that of wage workers. It is evident that the problem of low income is not only one of unemployment but also of type of employment, level of wage rate etc.

Table VI presents the distribution of workers in each category according to three income groups, i.e., those earning less than Taka 2500 per annum, those earning 2500 to 3500, and those earning Taka 3500 and more. On the basis of 1974 exchange rate and the assumption of 6 members per family, Taka 2500 implies a per capita income of US\$ 52 and Taka 3500, US\$ 74 [1]. To estimate absolute poverty in under-developed countries, two arbitrary 'poverty lines' are assumed at per capita incomes of US\$ 50 and US\$ 75. So, in our case these two lines may be taken at Taka 2500 and Taka 3500 respectively. On the basis of the 'income' or 'poverty' criterion the unemployment position of wage labourers is very serious both absolutely and relative to the self-employed. About 65 per cent of the wage labourers earn below Taka 2500 and about 80 per cent below Taka 3500. This figure is 23 and 45 per cent respectively, for the self-employed group, and 36 and 71 per cent respectively for the wage labourer and self-employed group.

TABLE V
DISTRIBUTION OF WORKERS BY INCOME POSITION

Income Groups (Tk. per annum)	Percentage in Each Group		
	Self-employed	Wage Labourers	Partly Self-employed and Partly Wage Labourers
Less than 2500	22.7	64.5	36.2
2500 to 3500	22.7	14.5	35.4
3500 and More	54.6	21.0	28.4

³Income includes earnings from all activities. Income from crop-cultivation has been estimated by deducting the expenses on seed, fertiliser, water and hired labour from the gross value of output.

⁴Average given by arithmetic mean may give a distorted picture, as the distribution of income may be skewed and the skewness may vary among different categories of workers. In this case median is a better measure of average.

TABLE VI

DISTRIBUTION OF WORKERS BY THE RATE OF UNDER-EMPLOYMENT AND INCOME

Under-employment Rate	Number of Workers					
	Earning Less than Tk. 2500		Earning Tk. 2500 to Less than 3500		Earning and Tk. 3500 More	
	Self-employed	Wage Labourers	Self-employed	Wage Labourers	Self-employed	Wage Labourers
50% and More	4	7	3	Nil	8	1
33% to 50%	3	8	6	1	10	2
17% to 33%	6	7	3	3	13	1
Upto 17%	3	14	2	3	6	Nil
Fully Employed	6	4	8	2	16	9

Another interesting point noted was that among workers who were fully employed on the basis of time criterion (working 300 days or more) the poverty-unemployed were higher among the self-employed as compared to the wage labourers (see Table VI). Among 30 self-employed persons who worked 300 days or more 14 earned less than Taka 3500 for per annum. There are two types of distressed groups among the self-employed. The first are those who are engaged in occupations like petty trading, paddy processing by 'dheki', weaving fishing nets etc.⁵ It was found that they worked for most of the days during the year, but since they are engaged in low productivity jobs, the income generated is inadequate. The other group consists of invalid, old and widows. They are able to participate in economic activity only partially. Widows worked for at best a few days collecting abandoned paddy and 'nara' in the field. Some others are found to be engaged in begging.

IV. SUMMARY

Unemployment is usually measured in aggregative terms. But in studying rural unemployment this is inadequate because of the prevalence of the 'seasonality' problem and the existence of different categories of workers like self-employed and wage labourers. This note focussed on unemployment problem in a village in Bangladesh using a disaggregative approach.

⁵In this group we noted a few 'Palki' carriers who comes from the 'sandar' caste whose members are traditionally engaged in this occupation. They were employed for more 200 days a year but earned less than Taka 1500.

Using a 300 days of work in a year as full-employment norm it was found that an worker, on average, remained unemployed for about 20 per cent of the time. About 25 per cent of the workers remained fully employed and another 30 per cent remained unemployed for more than 33 per cent of their time. Those remaining fully employed were higher among the self-employed compared to the wage labourers. The problem of unemployment was more serious in the poverty point of view. About 80 per cent of the wage labourers and 45 per cent of the self-employed were earning below poverty income. An interesting finding is that among the fully employed according to time criterion, the poverty unemployed were higher among the self-employed category than among the wage labourers. This is because quite a large number of self-employed are engaged in low productive jobs.

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Hand Pump Irrigation in Bangladesh : A Comment

by

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In a recent article on hand pump irrigation in Bangladesh, Hannah [4] discusses its employment and distributional effects, and recommends its wide introduction in this country. His recommendation has important policy implications and therefore, this note attempts to make a few points on his observations.

1. Hannah observes that hand tubewells (manually operated shallow tube-wells for irrigation) have reached small farmers. The implication of this observation is that benefits of this new form of irrigation technology accrue to them. Therefore he regards the incidence of benefit as a good ground for promoting hand pump irrigation. Whilst the logical sequence in this argument are acceptable the premises require examination. Most small farmers in Bangladesh are tenant or part-tenant farmers. They are unlikely to reap any substantial benefit from improved production technology because of widespread practice of restrictive land tenure system which is often regarded as exploitative in nature [2]. Despite the empirical evidence that any profitable innovation fails to give substantial benefits to the poor, Hannah expects that this manually operated, small scale, low cost irrigation device will help distribute benefits in favour of small farmers. Indeed, there is some evidence that the level of exploitation of the small farmers by large landowners is relatively higher in hand pump irrigation than under public tubewell irrigation. In a comparative study of different system of tubewell irrigation in Mymensingh district Jaim [3] reports that under deep tubewell irrigation small tenant farmers paid only one-half of gross paddy output as rent for rented-in land, whilst under hand pump irrigation they had to

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pay not only one-half of gross output as rent for land but also about another one-fourth as rent for hiring-in pumps from large farmers (and put in labour of about 200 man-days per acre). To further explain the nature of exploitation in hand pump irrigation, the same study reports that the few small farmers who purchased and used their own hand pumps had to sell either their bullocks, corrugated tin sheets from dwelling houses and other household assets, to pay for these hand pumps. It is true that in absence of any public tubewell irrigation facilities and in spite of exploitative rental arrangements for land and hand pumps, small farmers had to grow paddy with hand pump irrigation in order to avoid starvation at a time of amazingly high prices of food grains¹ in 1974/75. However, my field survey and discussions with farmers in a few hand pump concentration areas such as Kuliarchar and Jamalpur of Mymensingh district in the course of research in 1977 (currently being analysed) gives me the impression that the use of hand pump irrigation has in fact diminished over the recent *boro* crop seasons in Bangladesh. I suggest that this is mainly due to the large fall in paddy/rice prices (and the introduction of public tubewell irrigation in some areas).

2. Although hand pump irrigation has obviously some advantages over other irrigation technologies in relation to capital cost, repair and maintenance and fuel requirement, a rapid increase in food production seem unlikely to stem from it because of the following reasons :

- (i) area irrigated per pump is too low to cover a wider area;
- (ii) the degree of land fragmentation is so high that the average size fragment² is quite inadequate to utilize even a hand pump fully;
- (iii) scarcity of family labour for the arduous work involved even on small farms is likely to act as a constraint on using efficiently more than one or two pumps per farm;
- (iv) in the drinking water field, hand pump maintenance problems have not been solved in Bangladesh, even though the technology is relatively simple and the pumps are much less intensively used than for irrigation.

Although Hannah reports that each pump requires a full working time attention of one person, it is not practically possible for a single man to pump uninterruptedly for more than 3—4 hours for several days in succession (if he

¹Rice prices rose in places as high as Taka 300.00—350.00 per maund.

²An estimate reports the average size of a fragment to be around 0.15 acres [5, Tables 14—16].

doubts this, perhaps Mr. Hannah should try it for a week !). I have observed that three or even four labourers are required alternately to pump a tubewell day and night.

3. Other points which also may suggest caution in judging the obvious attractions of hand pumps include (i) average yield per acre and benefit-cost ratio in the case of hand pump irrigation are reported, at least in some cases, to be much less than in public tubewell irrigation [1 ; 3], (ii) hand pump irrigation causes some wastage of extremely scarce crop land as the farmers have to construct pump houses/sheds for each tubewell on crop land, and (iii) hand pumping operation involves extreme drudgery, continuous pumping often causes blisters and wounds in pumper's hand.

Hannah has rightly pointed out the serious underutilization of deep tubewells. However, what is needed is perhaps not to avoid deep tubewell irrigation but to reform the operating practice, by encouraging effective farmer's organization and better repair and maintenance facilities.

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Book Review

Rural History of Bangladesh: A Source Study by Sirajul Islam, Published by Tito Islam, Dacca, 1977 (Price : Tk. 30.00).

"Our historiography has always been concerned with war and piece, rulers and their rules, community and communal relations, politics and nationalism" notes Professor Islam at the beginning of this volume, yet "we remain pitifully ignorant of our own *gram* or village which is the very basis of our social system". This book is offered as a guide to scholars interested in trying to redress the balance by attempting the formidable task of writing the detailed rural history of Bangladesh. While directed primarily at the historian it should also prove useful to social scientists carrying out village studies who want to gain a historical perspective on their communities.

The book is divided into eleven sections, each dealing with a different type of source material.

Sections 1, 2, 3 and 5 summarise the sources to consult if researching *Zamin-dars* and *zamindaris*—the records on estates that paid revenue to the government. These data from the permanent settlement in the case of the 'Quinquennial Register Estates' and soon after in the case of the 'Pargana Registers', but are most detailed after the Bengal Act VII of 1876 when the 'General Registers' of revenue and non-revenue paying lands kept both by landowner showing the extent of their *zamindaris* and by *mauza* showing the interests of different *zamindaris* in a particular revenue area were instituted. Also from 1876, an 'Intermediate Register' of all changes to the 'General Registers' was maintained enabling the scholar to trace the rise and fall of different *zamindaris* from that time until their abolition by the State Acquisition Act of 1950.

Section 4 briefly introduces the 'Noabad Registers' which record the settlement of those uncultivated jungles (*noabad*) in Chittagong and Sylhet that were left out of the Permanent Settlement. This almost unknown material should provide the basis for a fascinating study of nineteenth and early twentieth century agricultural colonisation.

The correspondence between the Board of Revenue which managed the land administration and the District Collectors covering topics such as agrarian problems, cropping patterns, land tenure and so on are discussed in Section 6. Since land revenue was the major source of revenue for the state until the end of the last century it is not surprising that the correspondence was voluminous—in fact it runs to over 4000 big volumes now held in the Dacca Secretariat Record Room. In the same place are the printed proceedings of the Lt. Governor of Bengal which cover a variety of subjects including agriculture and are outlined in Section 7.

However, it is in Section 8 that the most valuable source for anybody trying to write the rural history of Bangladesh—the Survey and Settlement records—is

discussed and this is done at length. As Professor Islam notes, it is incredible that such a valuable collection of materials easily available in the various district *mahafez khana*s (record rooms) has remained almost totally unused by scholars to date. Each of the six Survey and Settlement operations carried out under the British is discussed—the Thakbust Survey (1845—77), the Revenue Survey (1846—78) the *Khasra* Operations (1841—54), the Diara Survey (1862—83), the Cadastral Survey (1890—1940). For each operation detailed summaries of the kinds of socio-economic and other data collected are given and the limitations of the material carefully pointed out. Understandably, most space is reserved for discussion of the Cadastral (field by field) survey which recorded every individual's rights in land, gives descriptive accounts of every *mauza* (revenue unit about the size of a village), detailed statistics of all estates in the *mauza* concerned and a 'tenure tree' to help the reader see at a glance the complex of intermediate interests between the *Zamindar* and the cultivator. This is perhaps the most comprehensive material available, and it is made all the more valuable because revisional cadastral surveys are going on currently in different parts of the country (Rajshahi and most of Dacca are complete) which will make it possible to trace the development of these rural areas over the intervening 60—70 years.

Section 9 and 10 are bibliographies of Survey and Settlement reports and Government publications of interest to the rural historian respectively, and Section 11 lists more than 150 published works from a variety of disciplines that deal with village Bangladesh.

Professor Islam sets out to provide a guide for scholars who want to know what historical sources are available, what information they contain, what the major limitations of the sources are, and where they kept. This job he carries out admirably, and for that reason we can probably forgive the book its terrible layout and large number of printing mistakes. However, there are two more important criticisms which one can make of the book. First, Professor Islam ignores some valuable sources such as the censuses and the indexed volumes of the district land registries which give details of each and every recorded land transaction from the 1890s to date. Secondly, the book does not provide us with any examples of the sources in action—of how the different materials can be fitted together to produce a coherent picture of the development of agrarian relations in different parts of Bangladesh. But this is hardly his fault since the work remains to be done. In years to come we shall probably look back on this book as the catalyst that started the kind of painstaking research needed to broaden and deepen our understanding of the rural history of this part of Bengal.

St. John's College, Cambridge and

Department of Geography, Dacca University.

Steve Jones

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Editors' Note

There has been exceptional delay in bringing out this issue of our journal due to a number of unavoidable circumstances. The Editorial Board of the journal wishes to convey its sincere regrets for this delay to all its patrons and subscribers.

Two changes are introduced starting with the Winter '78 issue of the journal. From now on, the contributors of articles (excluding notes, correspondences etc.) will be required to submit abstracts (not exceeding 200 words) of their papers and if selected for publication, the abstracts will be published alongwith the papers. Secondly, it has been decided to discontinue the practice of designating the four issues corresponding to the four quarters of a year by the name of the first month of the respective quarters. Instead, they will be designated by the names of four major seasons in Bangladesh e.g., Winter, Summer, Monsoon and Autumn. Accordingly, the current issue which would have been called the "April issue" according to past practice is now called the "Summer issue".

Price Support Versus Fertilizer Subsidy for Increasing Rice Production in Bangladesh

by

RAISUDDIN AHMED*

The relative efficiency of the price support of rice compared to the fertilizer subsidy policy—both competing for scarce budgetary resources—is evaluated in the paper. An analytical framework is developed to obtain measures of the evaluation criteria. The results indicate that the fertilizer subsidy policy is more efficient than the price support policy in increasing production. Sensitivity tests with respect to some important assumptions do not change the basic conclusions. Distributional implications also tend to favour fertilizer subsidy policy. One implication of the results is that, for any reduction in the budgetary burden of subsidy, the government should explore the price support programme before reducing fertilizer subsidy.

I. INTRODUCTION

Bangladesh is one of many developing nations striving hard to achieve self-sufficiency in foodgrain production. The efforts for increasing foodgrain production are heavily dependent on the use of modern inputs, namely fertilizers, irrigation and improved varieties of foodgrains. Because of a set of complex constraints in the expansion of the area under irrigation and the use of high-yielding varieties, the role of fertilizer in the increase of production has assumed a special importance among the available modern inputs. The present level of fertilizer application in rice is very low—about 36 pounds (16.5 pounds in terms of nutrients NPK) per acre. Rice crops consume about 88 per cent of the total fertilizer consumption in the country [5]. Government has been pursuing a price policy providing support prices for rice and subsidized prices for fertilizers, with a varying degree of effectiveness of these policies. Before 1973, the fertilizer used to be heavily subsidized—the extent of subsidy was around 65 per cent. The process of gradually reducing the subsidy on fertilizers started at the time of formulation of the 1972/73 development budget. The First Five Year Plan of the country suggested a policy shift in the same direction. Budgetary constraint

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was the main consideration in this shift of the subsidy policy of fertilizers. By 1974/75, there was no subsidy on urea fertilizer and the overall rate of subsidy on all fertilizers was about 27 per cent.

The price support policy involves procurement of paddy by the government at harvest time at a given price. Before 1974/75, government procurement programme was not a mechanism for a substantial price support. During the last two years procurement price and mechanism have been set to provide substantial incentives to producers. During this process of reorientation of the procurement programme, the policy makers came to the realization that the price support programme and the fertilizer subsidy programmes, both designed to provide incentives to increase production, cannot be seen separately. In fact, during the stage of formulation of the 1976/77 development budget, the questions of whether to reduce subsidy on fertilizer and provide a higher effective support price for foodgrains, or increase subsidy on fertilizer and relax price support for foodgrains, turned out to be issues of intense debate among policy makers.

At this stage, an important clarification is called for. These two policies are alternatives only from the point of their competitive claims on the scarce budgetary resources of the government. Certain stabilization policies, e.g., buying rice when price falls unusually low at the harvest season of a good crop, and selling at the lean season without involvement of government subsidy, are not what we would consider as alternatives of price support versus fertilizer subsidy. The difference is subtle but nevertheless, important.

The purpose of the present paper is to evaluate the relative merit of the price support versus fertilizer subsidy policies. First, a framework of analysis outlining the interrelationships among important variables is presented. Finally, the results of the analyses and indications to policy choices are discussed.

One basic assumption relating to the rice price and production is that price alone cannot cause a large change in production; other ancillary policies designed to improve technology, and supply and services of modern agricultural inputs are essential for this purpose. The analysis is therefore limited to short-term effects.

II. A FRAMEWORK FOR POLICY EVALUATION

For evaluation of the alternatives—price support versus fertilizer subsidy programmes—a number of criteria are considered appropriate. These are social benefits, budgetary burden, foreign exchange savings and distributional implications. The social benefit measure can incorporate budgetary burden and foreign exchange effects to provide a single criterion. But distributional implications

are too complex for collapsing into a single criterion and therefore presented separately. The precise definitions of the measures are as follows :

- (1) Total Social Benefits = Producers' benefit + Consumers' benefits + Increase in government revenue + Premium on foreign exchange savings
- (2) Net Social Benefit = Total social benefit — Direct government cost
- (3) Net Government Cost = Direct government cost — Government revenue

The values of these measures are estimated employing the model developed by Barker and Hyami [2] for developing market economies. The modification of the Barker-Hyami model is carried out to the extent necessitated by the context of Bangladesh — specifically — to accommodate the jute-rice acreage substitution arising from the changes in their relative prices, and the practice of supplying all imported rice through the rationing system.

One basic assumption of the model is that a reduction in fertilizer prices does not significantly affect the use of other inputs, particularly labour which is the most important factor of production in rice—after land. The complementary and competitive relations among factors are highly complex so that identification of the direction of possible bias because of this assumption is difficult. Other assumptions would be clarified as we proceed with the operational description of the model. We consider only rice and jute which account for about 92 per cent of the total fertilizer consumption.

A geometric version of the model is presented in Figures 1 and 2. In Figure 1, SS represents the domestic supply curve of rice at the existing prices of fertilizers. The vertical line D_hH represents the demand curve of producers for home consumption. The total demand is represented by D_hmD . The horizontal distance between D_hmD and D_hH measures the quantity marketed.¹

The demand curve for home consumption (D_hH) has been drawn as insensitive to prices on the basis of studies in subsistence economies like India [8] and the Philippines [12]. Availability of close substitutes for rice in the consumption and crop-combinations of farmers largely determines the degree of sensitivity of home consumption of rice to changes in market prices. Comparative analyses in South and South-east Asian countries show that contribution of rice in the total nutritional intake is highest in Bangladesh [4], indicating a relative scarcity of substitute for rice. This would imply a highly inelastic demand curve for home consumption.

¹The demand curve representing the marketed quantity, not drawn separately, would run parallel to the total demand curve at its left at a distance equal to the difference between D_hH and the vertical axis.

The initial situation in Figure 1 shows a market price of P_d ; at this price OQ_0 quantities of rice are consumed at home and from the free market. Another $(Q_c - Q_0)$ quantities are imported and distributed through rationing. Substitution of domestic production for this quantity of import can be done by—(1) raising the producers' price to OP_s or (2) by shifting the supply curve to $S'S'$ position by reducing fertilizer prices. These are the two policies evaluated in the paper. It is assumed that in implementing either of these programmes, government maintains the market price of rice at the pre-programme level (P_d). This is required to protect consumers under the price support programme from high market prices. Under the fertilizer subsidy programme, the market price at P_d is maintained simply through procurement of AB quantity for the rationing system. Moreover, rice prices and its stability are extremely important not only for consumers and producers but also for its indirect effect on wage rates and employment. Because of urban-orientation of the rationing system, most of the burden of shortage falls upon rural consumers, mostly landless labourers and small farmers. Stability of market price of rice at a reasonable level is important for their welfare. The level of P_d represents 1976 average price of retail medium quality rice (Tk. 152.5 per maund).

Except 1973/74 and 1974/75, domestic prices of rice have been above the international prices—(P_w). However, ration prices (P_r) have always been below P_w . Import substitution for rationing would therefore imply a net increase in subsidy cost for rationing.

The detailed methods of calculations of the criteria measures, with exact algebraic formulations, are presented in the appendix. A brief explanation of the geometric version of the model is included here.

Rice Price Support

Assuming a fixed domestic supply schedule (SS), the increase in production of rice to the level of OQ_c can be achieved by supporting the producer price at OP_s . Since the government maintains the consumer price at OP_d , the increase in production of rice would involve a cost to the government represented by area $ACLM$ as a difference between the procurement cost and the sale. In addition, import substitution of AB quantity of rice would result in an increase in ration subsidy (negative government revenue) by area $ABRT$ with no change in world price at P_w .

With the support price at OP_s , producers' revenue from the sale of rice would increase by area $(ACLM + ABQ_0Q_c)$, but the cost of the rice to the producers would also increase by area CBQ_0Q_c . The difference (area $BCLM$) represents an

increase in the income of rice producers at a cost to the government. Consumers' welfare does not change because neither P_d nor P_r is changed.

A net saving in foreign exchange in the rice sector is the area RTQ_0Q_c minus the foreign exchange cost of the increased import of fertilizers, if any, due to an increased application of fertilizers stimulated by a more favourable ratio of fertilizer price to rice price.

The rise in rice price will cause a rise in rice-jute relative prices and hence a reduction in jute acreage—the extent being determined by the responsiveness of jute acreage to relative rice-jute prices. The magnitude of loss of producers' income and foreign exchange earnings from the reduction in jute acreage (and hence production) will be determined by the supply and demand elasticities of jute. Moreover, a fall in jute-rice price relative will imply a fall in fertilizer demand for jute and therefore a foreign exchange savings if this reduces import of fertilizers.

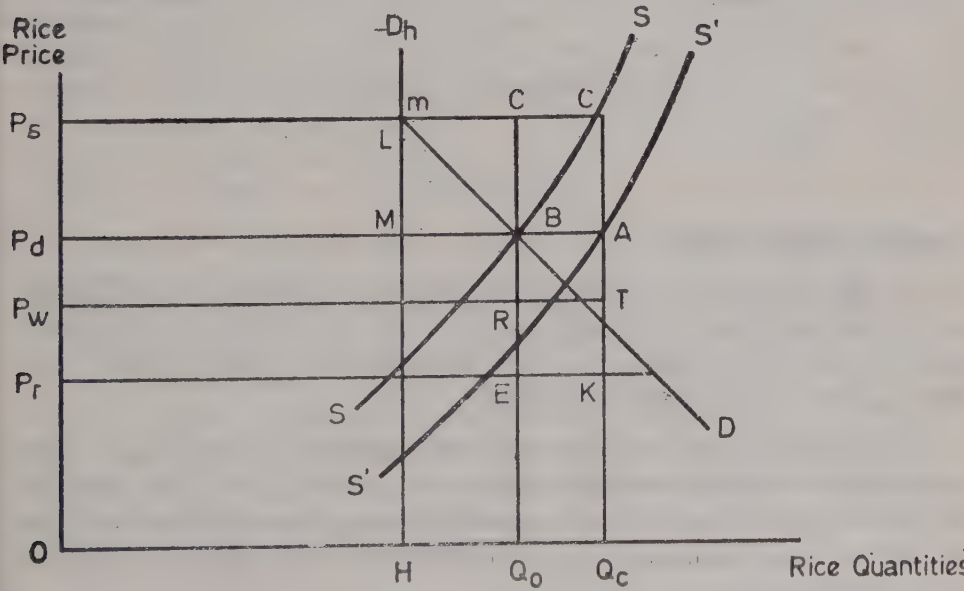


Figure 1

The loss in producers' income and foreign exchange earnings on account of the jute sector must be deducted from the gains in the rice sector resulting from the price support policies in rice, to arrive at the net social effect of the support policies.

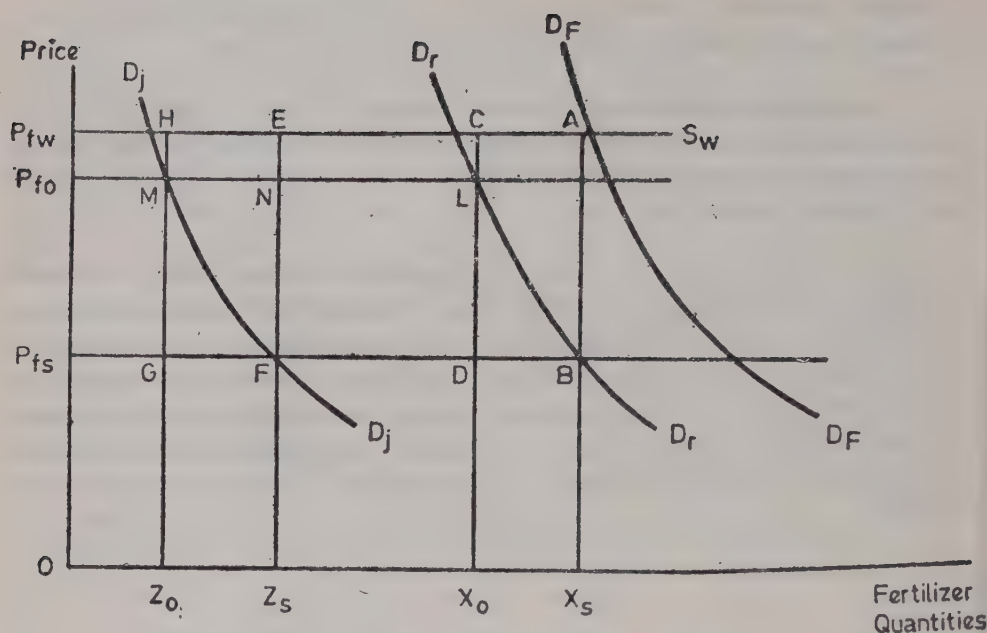


Figure 2

Fertilizer Subsidy for Rice

The desired increase in the production of rice can be achieved without supporting the producer price by shifting the supply curve from SS to $S'S'$ in Figure 1. Since the supply curve represents a marginal cost curve, it can be shifted to the right by lowering the price of the input.

Given the elasticity of rice production with respect to fertilizers and the price elasticity of demand for fertilizer used for rice production, we can determine the quantity of fertilizers required to obtain the target increase in the production of rice and the decline in price required to induce this additional fertilizer consumption needed.

A model of the fertilizer market is shown in Figure 2. The demand curves for the rice ($D_r D_r$) and the jute ($D_j D_j$) sectors can be added horizontally to obtain the total demand curve ($D_r D_r$). The supply curve SW is assumed to be perfectly elastic at the world price level. To avoid confusion between subsidy to farmers for fertilizers and subsidy to fertilizer industry, it is assumed that the domestically produced part of fertilizer supply will also be available to the government

at world prices. As in the case of price support programme, fertilizer subsidisation will have its effects on both rice and jute sectors. We look into the repercussions in the rice sector first.

If the price of fertilizer applied to rice must be subsidized at OP_{fs} to achieve the target of increased production, the government cost of fertilizer subsidy to rice is represented by the area $ABP_{fs}P_{fw}$ in Figure 2. The increase in ration subsidy (negative revenue) due to a decrease in the rice imports as a result of the increased domestic production remains the same as in the case of price support of rice.

The rice producers would receive a dual benefit from being able to buy all their fertilizers at a lower cost as represented by the area $LDP_{fs}P_{fo}$ in Figure 2, and from the increased output value, area ABQ_0Q_c (in Figure 1) minus fertilizer cost from using additional amounts of fertilizers because of the more favourable price relationship, area BDX_0X_s in Figure 2.

Net savings in foreign exchange can be shown as the net reduction in foreign exchange expenditures for rice imports, area RTQ_0Q_c in Figure 1 minus the increase in foreign exchange requirement for increased fertilizer import area ACX_0X_s in Figure 2 if the entire additional quantities of fertilizer are imported. As in the case of rice price support, the welfare of rice consumers does not change because they consume the same quantity of rice at the same rice irrespective of the support or subsidy programmes.

Turning now to the jute sector, a reduction in fertilizer price will induce an increased use of fertilizer on jute by the Z_0Z_s quantity. This will increase jute production by the quantity determined by the elasticity of jute production with respect to fertilizers. Like rice, jute producers would receive a dual benefit: (1) lower cost on fertilizers represented by the area $MGP_{fs}P_{fo}$ in Figure 2, (2) increased income equal to the value of the increased jute production minus the cost of the additional amounts of fertilizers on jute, area GFZ_0Z_s in Figure 2. The government subsidy on jute sector is represented by the area $EF P_{fs}P_{fw}$ in Figure 2. Foreign exchange implication in the jute sector is limited to the increased amounts (Z_0Z_s) of fertilizers used on jute.

The net impact of the subsidy programme will include all the above pluses and minuses in the jute and the rice sectors in respect of producers' income, government subsidy and the foreign exchange savings (dissavings).

III. PARAMETERS AND DATA

The parameters and data required for calculation of the producers' income, government subsidy, foreign exchange implications and the magnitude of the

price support and the subsidy programmes involved are briefly summarized in this section.

1. Increase in the Production of Milled Rice

The target of increase in domestic production of rice is assumed to be 500,000 tons. This would imply an increase of production of rice by 4.22 per cent from the base year level of 11.84 million tons. The base year consumption of rice (including seed, feed and wastage) was about 12.34 million tons. Most of the foodgrain import in Bangladesh consists of wheat. An increase of rice production larger than the target would imply substitution of wheat import. However, the magnitude of the target increase in rice production has been chosen at a low level because of the short-run nature of the policies under evaluation.

2. Marketed Quantity

Because of a lack of definitional distinctions between 'marketed' and 'marketable surplus' the statistics in this respect are somewhat confusing. The marketed quantity is likely to be larger than marketable surplus in the context of Bangladesh where a lot of farmers are both buyers and sellers, at different times of the year. A Survey of 3,000 farms in the *aman* season of 1972/73 indicated that about 33 per cent of the *aman* paddy was marketed in that year. The *aman* rice constitutes about 55 per cent of the total rice crops in most years. Two other types of rice, *aus* and *boro*, are also marketed. Limited information on market arrivals recorded by the Marketing Directorate indicate that the proportions of *aus* and *boro* in the total market arrival is lower by 11 per cent points in the case of *aus*, and by 7 per cent points in the case of *boro*, compared to the proportions of the three types of rice in the total production. Assuming that the proportion of marketed surplus in *boro* and *aus* would be lower than the *aman* by the same extent as in market arrivals, the weighted average marketed surplus in rice would be 29 per cent. We have used this estimate in the present analysis. The estimate of marketed surplus in Master Surveys of Agriculture are about 10 per cent which is more akin to the definition of marketable surplus. Moreover, this estimate relates to a distant past.

3. Jute Production and Consumption

The production of jute fluctuates considerably depending on weather and jute-rice price relatives. The production was estimated to be about 5 million bales (907 thousand tons). About 88 to 90 per cent of the jute production is meant for export. It is assumed that any change in jute production is going to affect the export in the same direction by an equivalent amount.

4. Fertilizer Use in Rice and Jute

A total quantity of 439,000 tons of fertilizers was used in 1975/76. Based on monthly fertilizer distribution and farm management studies World Bank Missions have estimated that about 88 per cent of the total fertilizer consumption goes to rice and 3.4 per cent goes to jute in recent years. These assumptions are used in this analysis. The combination of nitrogeous, phosphatic and potassic fertilizers in 1975/76 was in the proportion of 70 : 25 : 5.

5. Domestic Retail Price of Rice

The domestic average retail price of rice in 1975/76 was Tk. 152.5 per maund. The prices were coming down from the record high level of 1974/75. The pricing policy in rice has to strike a balance between the welfare of consumers and producers. It is assumed that the 1975/76 price level of rice is maintained.

6. World Price of Rice

World prices of rice at c.i.f. Chittagong, are based on quotations for 35% broken f.o.b. Bangkok and the shipping charges. The c.i.f. Chittagong price of rice was US \$ 140.70 per ton in 1969/70 and went up to about US \$ 490 per ton in 1974/75. The prices have since come down to about US \$ 200 per ton by the end of 1977. This is taken as the normal level of world rice price. On this basis, the c.i.f. Chittagong price of imported rice is Tk. 112 per maund at the official exchange rate of \$1 = Tk. 15. Taking into account the estimated marketing cost at about 24 per cent of the retail level, the retail price of imported rice would be about Tk. 146 per maund.

7. Price of Jute

The announced minimum price of raw jute at the farm rate supported by the government was Tk. 90 per maund. The actual price at the farm level varied from Tk. 85 to Tk. 100 per maund for the average quality jute. We assume Tk. 90 per maund as the farm level price. The export price (f.o.b. Chittagong) for raw jute in 1976/77 was about US \$ 344 per ton (Tk. 192.5 per maund). The tax rate on raw jute export is assumed to be Tk. 303 per metric ton.

8. Price of Fertilizer

At present Bangladesh meets its requirements of nitrogeous fertilizers from domestic production, and imports almost all of its phosphatic and potassic fertilizers. Taking into account the urea factory under construction, the present pattern is likely to persist for the near future. But as explained in the previous section, we shall not make any distinction here between domestically produced and imported fertilizer, and assume that both have a perfectly elastic supply curve at world prices. The current world price (f.o.b., US Gulf, Japan, Canada) of urea

is between US \$ 115-130 per metric ton. The prices of murate of potash and triple surperphosphate are US \$ 50-60 and US \$ 114 per metric ton respectively [7]. Taking the mid points of the price ranges and making a weighted average (using the proportions of urea, phosphatic and potassic fertilizers presently used as weights), the f.o.b. price per ton of fertilizer works out to be US \$ 117 per metric ton. Adding the shipping cost (from US Gulf to East Indian Coast), the c.i.f. Chittagong price of fertilizers is estimated to be US \$ 142 per metric ton. Adding the cost of distribution at the rate of 25 per cent of c.i.f. cost at 1975/76 prices, the farm level cost per maund of fertilizers would be Tk 99.4 at the official exchange rate. The present sale price to farmers (at a weighted average basis) is Tk. 56 per maund.

9. Price Elasticity of Rice Production

Two studies are known to have addressed to this question in Bangladesh. A relatively recent study by Cummings [3], using district-wise time series data, estimated the short run price elasticity of rice acreage to be 0.13. This was about the same estimate made by Hussain and reported in [3]. This estimate of price elasticity of rice acreage is converted into price elasticity of rice production by adjusting for the effect of price changes on yield. The price elasticity of rice production thus calculated works out to be 0.18.

10. Price Elasticity of Demand for Fertilizers

Very limited information is available in this respect. A study using time series data came out with the estimate of short run price elasticity of demand for fertilizers at -0.34 [1]. Taking the estimates of marginal physical product of fertilizer from a production function, and setting the marginal value product as equal to fertilizer price, one can draw a demand schedule for fertilizers. Using the production function analysis of rice as in [1], the elasticity of such a demand curve for fertilizer is estimated to be about -1.0 . This estimate is based on a perfect behavioural assumption which is most likely to be violated in the case of risk-prone farmers of Bangladesh. As much this could be taken as an upper limit of the elasticity estimate and the true estimate is probably in between -0.34 and -1.0 . Working with farm level data Peter Timmer estimated the short run price elasticity of demand for fertilizer in 5 Asian countries as between -0.5 to -1.0 [11]. For the present analysis, the elasticity estimate is assumed to be -0.5 , in respect of both rice and jute.

11. Production Elasticity of Fertilizer

This is defined as the percentage change in production due to a percentage change in fertilizer application $\left(\frac{\partial Q}{\partial F} \cdot \frac{F}{Q} \right)$. Based on production function analysis reported in [1], these estimates are as follows : 0.104 for rice and 0.06 for jute.

12. Price Elasticity of Jute Production

Considerable work has been done in this field in Bangladesh. In an earlier work by Rabbani [9], the short run elasticity estimate was 0.4. A recent study, employing the same methodology as Rabbani, but using recent data, came out with the estimate of price elasticity jute acreage (short run) at 0.21 [1]. Rabbani and Delwar Hussain in the Bureau of Statistics working with the recent data came out with the elasticity estimate at 0.22. All the above estimates are acreage elasticities. Taking the price elasticity of jute acreage at 0.22 and adjusting it for the effects of price changes on yield (as in the case of rice), the price elasticity of jute production is assumed to be 0.25 in the present analysis.

13. The Price Elasticity of Export Demand

The price elasticity of export demand for Bangladesh raw jute is assumed to be highly elastic. It implies that a marginal change in jute production in Bangladesh causes little change in the price in the world market. Studies by Repetto [10] and the World Bank [6] support the assumption quite closely. High supply elasticity of competing countries and overall competition from synthetic substitutes combine to make world prices to change little by marginal changes in jute production in Bangladesh. Moreover, even a modest change in this parameter value does not significantly change the results and the conclusions.

IV. EVALUATION OF POLICY ALTERNATIVES

Some estimates of the criteria defined in Section II for evaluating the two alternative programmes, are presented in Table I. The first pair of results in the table are based on the assumptions discussed in the text and the other pairs on sensitivity analysis with respect to some of the assumptions.

The total social benefit is substantially large under both the programmes but the net social benefit is negative for the price support programme. As would be clear from the description of the model the low price elasticity of rice production, substitution of rice acreage for jute, and comfortable domestic production of fertilizers, all contribute to the relative superiority of fertilizer subsidy policy over the price support policy. The budgetary burden of the price support policy, with the initial sets of assumptions, appears to be about 3.5 times heavier compared to the fertilizer subsidy policy. In terms of farmers' income price support policy seems to have superiority over fertilizer subsidy policy; the producers' benefit with price support is about 58 per cent larger than with fertilizer subsidy. However with the same sets of initial parameter values, the fertilizer subsidy policy turn out to be superior to price support policy in terms of foreign exchange savings.

Sensitivity of the Results

Three important assumptions: (i) price elasticity of rice production, (ii) fertilizer prices, and (iii) demand elasticity of fertilizers are relaxed to see the changes in results. These three assumptions are picked up because of their weights in influencing the results as well as for certain degree of controversy surrounding these values originating from recent structural changes. It has been argued that pre-independence development in agriculture in Bangladesh, particularly the 1974 crisis and the seed-fertilizer technology, has increased the degree of commercialization among the large farm groups. The estimates of increasing marketed quantity found through limited surveys and field observations, are cited as an evidence. This belief, if true, would imply a higher responsiveness of production to product prices, than in the past. To test the implication of a higher supply elasticity, we select the alternative value of the supply elasticity at 0.3. This would perhaps provide results of the limiting case of a short run.

Fertilizer prices in the world market registered a sharp rise during 1974/75. Thereafter these prices have come down quite fast. To test the implication of a sharp rise in fertilizer prices, we have set an alternative price level for fertilizers which is 30% higher than what was assumed initially. Moreover, distribution cost of fertilizers is assumed to be a proportion (25%) of the ex-factory or c.i.f. price, instead of Tk. 15 per ton as assumed earlier. Though the initial value of price elasticity of demand for fertilizers is considered quite realistic, we select the alternative value of -0.35 to see the changes in results.

The results of the above changes are presented in the last four columns of Table I.

The net social benefit of the price support programme is still negative although it is much better than under the original assumptions. The higher value of the supply response parameter causes a decline in the government cost of the price support programme by about 43 per cent and in the producers' benefit by also about 43 per cent. The changes in the assumptions cause foreign exchange savings from the price support programme to rise by only about 7 per cent.

The alternate assumptions of higher fertilizer price and a lower price elasticity of demand for fertilizers, reduces the net social benefit of the fertilizer subsidy policy by about 69 per cent; but it still remains positive. The direct government cost of fertilizer subsidy increases by 40-50 per cent for changes in the two parameter values. Higher level of fertilizer prices does not affect producers' benefit but causes an increase in net government cost of the subsidy programme. However, a lower value of price elasticity of demand for fertilizers causes a small increase in producers' benefit as well as direct government cost.

Distributional Implications

The previous discussion shows that price support programme favours the producers at the cost of the government. This redistributive implication is not so important in Bangladesh as the question of distribution of income among farms of different size groups. For the purpose of drawing a broad picture of distribution, all farms are classified into three size groups: (1) small (less than 3.0 acres), medium (3 to less than 5 acres) and large farms (5 acres and above). Due to lack of necessary data for a more rigorous analysis, we shall perhaps be raising more hypotheses than proving any.

TABLE I

**BENEFITS AND COSTS OF PRICE SUPPORT AND FERTILIZER
SUBSIDY PROGRAMMES**
(million takas)

Criteria	Price Support (1)	Fertilizer Subsidy (1)	Price Support (2)	Fertilizer Subsidy (2)	Price Support (3)	Fertilizer Subsidy (3)
1. Total social benefits	2,907	1,878	1,691	1,874	1,692	1,988
2. Net social benefits	-1,302	692	-714	212	-713	209
3. Producers' benefit	2,891	1,827	1,661	1,827	1,661	1,942
4. Government revenue	-103	-82	-97	-82	-97	-82
5. Direct government cost	4,209	1,186	2,405	1,662	2,405	1,779
6. Net government cost	4,312	1,268	2,507	1,744	2,507	1,861
7. Foreign exchange savings	1,703	1,899	1,819	1,839	1,825	1,834

Notes : 1. The first pair of price support (1) and fertilizer subsidy (1) represents all initial parameters presented in the text. The pairs 2 and 3 represent sensitivity of results with respect to changes in certain parameter values. In pair (2) it is assumed that price elasticity of supply of rice is 0.3 instead of 0.18 and prices of fertilizers (c.i.f. and exfactory) are higher by 30%. In pair (3) all assumptions of pair (2) are maintained except the price elasticity of demand for fertilizers, which is changed to (-0.35) instead of (-0.5).

2. Foreign exchange premium is assumed to be 7% on the basis of estimated exchange rates following the "purchasing power parity theory" using the general price index in Bangladesh and U.S.A.

An estimate of the relative shares of the three size groups of farmers in the producers' income under the two alternative policies is presented in Table II. The estimate is based on the following assumptions:

1. Producers' income from rice under price support is distributed among different groups according to the proportions of marketed quantities in the respective groups (Data in the appendix). The same from jute is distributed according to the proportion of cultivated land in these groups.

TABLE II

DISTRIBUTION OF PRODUCERS' INCOME UNDER THE PRICE SUPPORT AND FERTILIZER SUBSIDY POLICIES

Farm Size	Price Support		Fertilizer Subsidy	
	Shares in Producers' Income (%)	Farms as % of Total	Shares in Producers' Income (%)	Farms as % of Total
Small	6.5	64.26	33.3	64.25
Medium	10.5	18.76	24.3	18.76
Large	83.0	16.99	42.4	16.99
Total	100.0	100.0	100.0	100.0

2. All groups have equal access to fertilizer prices and support prices for rice. If there is any discriminatory environment against any group, it is assumed to be prevalent under both the programmes.

3. Producers' income under the fertilizer subsidy policy is distributed according to proportions of fertilizers used by different groups.

The results in Table II show that the distribution of producers' income under the fertilizer subsidy policy is more egalitarian than under the price support policy. The results are however, only as realistic as the underlying assumptions. Apparently two important questions—one relating to equal access to prices and the other concerning tenurial relations—could violate the assumptions and hence the conclusion. Based on limited information, it is known that small farmers generally pay a higher price for fertilizers than large ones. But it is also known that small farmers do not get the same advantage of the price support programme as the large farmers [5]. The underlying market structures (in terms of number of dealers,

purchasing centres, and operating rules) of price support and fertilizer distribution are such that both programmes could possibly be considered equally discriminatory to small farm groups. So long as our interest is limited to relative rather than absolute impacts of the two programmes, the assumption of equal access does not appear to be severely restrictive.

Non-inclusion of the tenurial relations in the analysis would imply an over-estimation of the share of small farm groups in the producers' income under the fertilizer subsidy programme, if small farms have a larger proportion of tenanted land in the operated holding.² However, this would be true only with respect to sharecropping tenancy—not with other forms of tenancy. Even then, it would be more realistic to assume that a farmer, at a low level of fertilizer use, would apply fertilizers only on his owned portion of land and land under other tenancy arrangement except sharecropping, if he alone pays for the fertilizers.

Incorporation of the consideration of tenurial relations in the analysis becomes difficult because neither the Agricultural Censuses nor the Master Surveys of Agriculture provide data showing flow of tenanted land by types of tenancy arrangement among various size-classes.

Although this limitation renders the results in Table II somewhat inconclusive, it is unlikely that the direction of distributional impact of the two alternative policies will substantially change even if one could incorporate tenurial relations in the analysis.

V. CONCLUSION

The relative efficiency of price support *vis-a-vis* fertilizer subsidy policies to increase production of rice by half a million tons is evaluated in this paper. The analysis is based on normal relationships and reflects a short run situation. The criteria of evaluation include measures like social benefit, government cost, foreign exchange savings and distributional impact. Government subsidy is involved in both the price support and the fertilizer distribution programmes. Under a budgetary constraint, these two policies provide alternative ways of achieving the objective of increasing the domestic production of rice.

The results show that the total social benefit is substantially large (see Table I) under both the programmes but the net social benefit is negative for price support. The low price elasticity of rice production, substitution of rice area for jute in a

²The 1967/68 Master Survey of Agriculture (seventh round) does not show substantial differences in the proportions of tenanted land under various size groups.

tight land supply situation, and a high degree of self-sufficiency in fertilizers—all contribute to the relative superiority of fertilizer subsidy policy over the price support policy. The budgetary burden of the price support policy appears to be heavier than the fertilizer subsidy policy. This indicates that, even with a sharp increase in the cost prices of fertilizers, as happened in 1974/75, the government cost on fertilizer subsidy may not go up to outweigh its comparative superiority over the price support policy.

The distributional implications of the two policies, although somewhat inconclusive because of inadequate data, tend to show that fertilizer subsidy policy is more egalitarian than the price support policy.

To increase rice production by half a million tons only through an increased use of fertilizers, it would call for reducing the fertilizer prices from the present level of Tk. 56 per maund (weighted average for all kinds of fertilizers) to about Tk. 25.00 per maund. This policy would still be socially profitable, although it will require substantial budgetary allocation for fertilizers.

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Appendix A

Estimation Formulae

A simple power function with a constant elasticity is assumed for production, demand, and supply functions. The following notations are used:

Price elasticity of rice production (supply) $= \beta$

Elasticity of rice production with respect to fertilizer $= a$

Elasticity of jute production with respect to fertilizer $= d$

Price elasticity of fertilizer demand in case of rice as well as jute $= -e$

Price elasticity of jute production (supply) β_j

Price Support

(PS 1)—The government cost (difference between procurement cost and sales revenue including sales to rationing sector) area $ACLM = (P_s - P_d)(Q_c - H)$

(PS 2)—Increased ration subsidy (negative revenue) from import substitution of rice area $ABRT = (P_d - P_w)(Q_c - Q_o)$

where : $P_d = OP_d$, $P_s = OP_s$, $P_w = OP_w$, $Q_o = OQ_o$

$Q_c = OP_c$ and $H = OH$ in Figure 1.

(PS 3)—The relation between P_d and P_s can be established as

$$P_s = P_d (1 + K)^{\frac{1}{\beta}} \text{ where } K = (Q_c - Q_o) / Q_o$$

(PS 4)—Since we assume a constant-elasticity supply function,

$Q = cP^\beta$, where c is a scaler including supply shifters, an increase in rice producers' income due to government support is calculated as:

$$\begin{aligned} \text{Area BCLM} &= \text{Area BCP}_s P_d - \text{area MLP}_s P_d \\ &= (1 - mr) \left\{ \int_{P_d}^{P_s} c P^\beta dP - H (P_s - P_d) \right\} \\ &= (1 - mr) \left\{ \frac{1}{1 + \beta} (P_s Q_c - P_d Q_o) - H (P_s - P_d) \right\} \end{aligned}$$

Where : P_s and P_d are measured at retail levels and mr is the rate or marketing margin for rice assumed proportional to retail price.

(PS 5)—Decrease in producers' income from jute is :

$$= \left\{ \frac{1}{1 + \beta_j} (P_j Q_{j0} - P_j Q_{js}) \right\}$$

where : P_j = farm level price of raw jute

Q_{j0} = base production level of jute

Q_{js} = production of jute after price support of rice.

$$(Q_{j0} - Q_{js})/Q_{j0} = \left\{ \left(\frac{P_j}{P_{rs}} - \frac{P_j}{P_{ro}} \right) / \frac{P_j}{P_{ro}} \right\} \beta_j$$

$$\text{where : } P_{ro} = (1 - mr) P_d$$

$$P_{rs} = (1 - mr) P_s.$$

(PS 6)—Net increase in producers' income is :

$$\left\{ (PS\ 4) - (PS\ 5) \right\}$$

(PS 7)—Net savings in foreign exchange is equal to the savings in foreign exchange from reduced import of rice minus the foreign exchange cost of net increase in import of fertilizer (increase in fertilizer for rice, decrease in fertilizer for jute), minus the value of the decreased export of jute.

$$\text{Savings from reduced import of rice} = P_w(Q_c - Q_o).$$

Net increase in Fertilizer use:

$$\text{For rice } X_s = X_o (P_s/P_d)^{-e}$$

$$\text{For jute } Z_s = Z_o \left(\frac{P_j}{P_{rs}} / \frac{P_j}{P_{ro}} \right)^{-e}$$

$$\text{Net increase } \left\{ (X_s + Z_s) - (X_o + Z_o) \right\} = \Delta XZ$$

$$\text{Foreign exchange cost} = f(\Delta XZ) F_w$$

where : f = imported fertilizer as a per cent of total fertilizer demand (0.3)

F_w = c.i.f. price of fertilizer.

$$\text{Reduction in jute export} = (Q_{j0} - Q_{js}) P_{jw}$$

where : P_{jw} is the f.o.b. price of raw jute

(PS 8)—Reduced government revenue from lower jute export.

$$= (Q_{j0} - Q_{js})t$$

where : t = is the export tax per unit of Q_j .

Fertilizer Subsidy Policy

(FS 1)—The fertilizer input required to produce the higher level of rice production (Q_c) while other factors remain constant is :

$$X_s = X_o (Q_c/Q_o)^{\frac{1}{a}}$$

(FS 2)—The price of fertilizer that would induce farmers to apply more fertilizers at the level X_{rs} is

$$P_{fs} = P_{fo}(X_s/X_o)^{-\frac{1}{e}} = P_{fo}(1 + k)^{\frac{1}{ea}}$$

where : P_{fo} is the present farm level price of fertilizer, and $K = (Q_c - Q_o)/Q_o$

(FS 3)—Increased use of fertilizers on jute at price P_{fs} is:

$$Z_s = Z_o (P_{fo}/P_{fs})^{-e}$$

(FS 4)—Fertilizer subsidy cost is:

$$= (X_s + Z_s) (P_{fw} - P_{fs})$$

where : $P_{fw} = F_w + \text{unit distribution cost}$

(FS 5)—Increase in ration subsidy (negative revenue) from import substitution of rice remains as in the price support programme.

(FS 6)—Producers' income originates in rice and jute sectors:

Rice Sector

$$\text{Producers' gain} = (P_{fo} - P_{fs}) X_o + (1 - mr) P_d (Q_c - Q_o) - P_{fs} (X_s - X_o).$$

Jute Sector

$$\text{Producers' gain} = (P_{fo} - P_{fs}) Z_o + P_j (Q_{js} - Q_{jo}) - P_{fs} (Z_s - Z_o)$$

where : $Q_{js} = Q_{jo}(Z_s/Z_o)^d$

(FS 7)—Net savings in foreign exchange is equal to the savings from reduced import of rice minus the foreign exchange cost of increased import of fertilizers for rice and jute plus the value of increased jute export, i.e.,

$$\text{Net savings} = P_w (Q_c - Q_o) - F_w \left\{ (X_s + Z_s) - (X_o + Z_o) \right\} f + P_{jw} (Q_{js} - Q_{jo}).$$

where: f is estimated to be 0.48.

(FS 8)—Government tax revenue from increased jute export is :

$$(Q_{js} - Q_{jo})t.$$

Appendix B

FERTILIZER USE AND MARKETING QUANTITY OF RICE BY FARM SIZE

Farm Size	Percentage of Total Fertilizer Used ¹	Percentage of Cultivated Land ¹	Percentage of Total Marketed Quantity of Rice ²
Small	33.62	23.30	7
Medium	24.31	25.64	11
Large	42.07	51.06	82
All	100.00	100.00	100.00

Source : ¹ Bureau of Statistics, Master Survey of Agriculture, Seventh Round, Phase II, 1967/68, Dacca.

² Department of Agricultural Marketing, Marketed Quantity of Rice in Aman Season, 1975/76. (Unpublished Survey results), Dacca.

Factors Affecting Tenancy : The Case of Bangladesh Agriculture

by

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The apathetic attitude towards self-cultivation resulting from the social contempt for manual labour, alleged by many social scientists in South-Asia does not fully explain the existence of tenancy in Bangladesh, where a major portion of land in the tenancy market comes from resident households cultivating a part of their holding by themselves. Other factors mentioned in the literature, e.g., the level of natural risks and the wage also do not explain much of the variation in the incidence of share tenancy. This paper argues that in a monsoon dominated rice agriculture such as Bangladesh the nature of property distribution can substantially affect the existence and regional variation of tenancy, because it can influence the relative advantages of ownership cultivation with wage labour and cultivation through share tenants. The hypothesis has been tested with cross-section data at both macro and micro level.

I. INTRODUCTION

In many LDCs, different contractual arrangements in farming co-exist. Three common arrangements are (a) the wage contract, (b) the share rent contract (sharecropping), and (c) the fixed rent contract. In Bangladesh fixed rent tenancy is rare, but over 21 per cent of land is cultivated under sharecropping arrangements.¹

Why do some landlords and tenants prefer leasing (out or in) of land to hiring (in or out) of labour services? Why does the incidence of tenancy

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¹The 1977 Land Occupancy Survey of Bangladesh found that about 23 per cent of total cultivated land were tenant operated, about 91 per cent of which were transacted under crop-sharing arrangements.

differ within localities of Bangladesh?² This paper attempts to answer these questions with available macro and micro level data. The farm level information comes from two surveys. One was conducted by the Pakistan Institute of Development Economics during the 1969/70 crop year in two areas (Phulpur in Mymensingh district, and Thakurgaon in Dinajpur district). The other was conducted by the author in the same areas during August to November 1974. The first survey was conducted to obtain basically input-output type information and detail information on tenancy is not available. The aim of the second survey was to collect information on the operation of different markets, and so in depth information on various aspects of tenancy was collected. For macro level information we have to satisfy ourselves with the data provided by the 1960 Pakistan Census of Agriculture, as no up to date information on the incidence of tenancy at the district level is available.

The paper is organised as follows : Section II examines the traditional hypotheses for explaining the existence and regional variation of tenancy. In Section III additional hypotheses are proposed. The tests and results are described in Section IV and the findings summarised in Section V.

II. TRADITIONAL HYPOTHESES

Social Factors³

In the context of South Asia, a frequently offered explanation for widespread renting of land is that traditional social values inhibit landowners from self-cultivating their land. In these societies manual work is considered degrading. The social position of a household in rural areas is determined by the type of work it does. At the bottom of the social ladder are those who perform manual labour under other's supervision, followed by those who till the land by themselves. At the upper end are those who live a decent life without working at all. So, given a chance, everyone tries to dissociate himself from field-work in order to climb the social ladder.⁴

²There is a considerable regional variation in the incidence of tenancy in Bangladesh. In 1960, for example, in Comilla only 8 per cent of the cultivated land was tenant operated, whereas the corresponding figure for Dinajpur was 30 per cent (See Appendix Table I).

³For an excellent discussion of these factors see [10, pp. 1052-1064].

⁴Thorner and Thorner [15] noted 'In India there is an age-old feeling that manual labour, physical work, is degrading; whenever possible, such work should be left to the lowly, to inferior persons. In the villages there is one sure sign by which successful cultivators tend to show their economic condition is improving and that they now wish to raise their social standing: they and the members of their families stop doing the field work; instead they engage others to do it for them, or give the land out to tenants or cropsharers', p.6.

Those who do not want to self-cultivate their land, are at the same time induced by other economic and non-economic factors to retain possession of it. The most important are constantly increasing land values in the face of growing pressure of population on already densely settled land; the prestige associated with landownership; and the economic security that landownership provides. Many large non-cultivator owners may also prefer leasing out land to outright selling because, by renting land in small parcels to a number of tenants, they can create sub-ordinates who could be used to support them in village politics and local conflicts.

These factors are no doubt important in explaining the existence of tenancy but they account for only a part of the rental market in Bangladesh agriculture. Table I presents the share of different categories of suppliers of

TABLE I

SHARE OF DIFFERENT GROUPS OF LANDLORDS OF THE RENTAL MARKET, 1974

Areas	% of Tenant Operated Land Supplied by		
	Non-cultivator Landlords		Cultivator Landlords
	Absentee	Resident	
Phulpur	20.0	28.7	51.3
Thakurgaon	11.9	26.1	62.1
Both Areas	14.8	27.0	58.2

Note : This table is prepared from the information provided by tenants about the nature of their landlords. This approach was taken because it allows one to identify directly the owners of tenant-cultivated land, especially the absentee landlords who cannot be included in any sample of village studies.

rented land in the market as revealed by the 1974 survey. It can be seen from the table that less than a half of the land rented by tenants came from the absentee and resident non-cultivator landlords, the groups which should include households who rent out land because of such considerations as mentioned above. The major portion of land in the rental market were supplied by cultivator landlords, i.e., by those who had their own farming establishment. An important question that remains unexplained is why such people rent out a part of their holding instead of cultivating it with additional hired labour,

Natural Risks, Wage Rate and Incidence of Share Tenancy

Traditional economic theory argues that share tenancy is an inefficient form of production organisation as the terms provide incentives to misallocate resources [10], though some recent studies argue that the landlord can make a share tenant cultivate as intensively as an owner farmer through providing short-term leases [7] or dictating tenant inputs in the lease contract [2]. If share-cropping is less or just equally productive as other arrangements, why would a landowner be interested in cultivating his land under this arrangement?

Cheung has argued that the choice of a contractual arrangement in farming is determined by the level of natural risks which contribute to variation in output with the same level of inputs, and the transaction costs associated with different contracts [3, pp. 23-42]. Under the behavioural postulate of risk aversion (given the same expected average income, an individual prefers a lower to a higher variance), the landowner can increase his income through rental contracts which shift the risk entirely (fixed rent contract) or partially (share-rent contract) to the tenant. Similarly, the tenant can increase his income by shifting the entire risk to the landowner (wage contract) or by sharing it (share-rent contract). The existence of natural risks alone would, thus, imply that sharecropping is the mutually preferred arrangement as it helps to disperse the risk by both parties. But according to Cheung, the share-rent contract involves the highest transaction costs because of its complexity compared to other arrangements.⁵ Other contractual arrangements also involve transaction costs, e.g., the landowner has to bear the cost of supervising workers under the wage contract. The choice of a contract is then determined by weighing the gains of risk dispersion and the costs of transacting resources associated with each contract.

Full empirical testing of Cheung's hypothesis is not possible because it is difficult to observe transaction costs in different contracts. But assuming relative transaction costs are the same in different localities, one can expect, following Cheung, a positive relationship between the incidence of natural risks and the area cultivated under share tenancy.

Bardhan and Srinivasan have argued that the incidence of share tenancy can also be determined by the level of the wage rate and the area under irrigation

⁵Cheung [3] noted that in China in share rent contracts, the landlord specified the amount of inputs to be used on his land and the types of crops to be sown. Such a contract involves some transaction costs for the landlord, as he has to ensure that the term of the contract is fulfilled and the actual yield is stated. In Bangladesh, however, in the survey areas we did not find any evidence on input stipulation in the share rent contract, although some landlords dictate the choice of the crops [See, 5, pp. 119-120].

[1, pp. 1370–86]. In their model of crop-sharing tenancy, they have found that a parametric shift in the wage rate (which is assumed to be exogeneously determined) affects both the demand for and the supply of land under share tenancy and hence, affects the equilibrium amount of land rented. They expect a positive association between the wage rate and the incidence of share tenancy because an increase in the wage rate would raise the supply of land in the rental market but lower the demand for such land, and the result would be a reduction in the equilibrium rental share and an increase in the amount of land leased in. They have also found that with land augmenting technical progress, the amount of land leased under sharecropping goes up. And, since irrigation can be regarded as a factor bringing about land augmenting technical progress, they expect a positive relationship between the importance of irrigation and the incidence of share tenancy.

To see how far the above mentioned factors explain the incidence of share tenancy in Bangladesh agriculture, the following regression model has been estimated.

$$Y = b_0 + b_1 X_1 + b_2 X_2 + u$$

where, Y is the incidence of share tenancy, X_1 is the level of natural risks, X_2 is the money wage rate and u is the stochastic disturbance term. The irrigation variable has not been included in the regression equation because modern irrigation was almost non-existence in Bangladesh until the early sixties.⁶

The model has been estimated with cross-section data available for 16 districts of Bangladesh for the reference year 1960. The information on the incidence of share tenancy is taken from the 1960 Census of Agriculture and is measured as the land under sharecropping as a percentage of all cultivated land. The wage rate is measured in taka per manday of labour, and is calculated as unweighted average of the wage rate figures published for each month by the Bureau of Statistics. Measurement of the level of risk is, however, a complicated business. Here we have taken the time series of production of two major crops, *aman* and *aus* rice for 10 years preceding 1960 and have measured the level of risk by the coefficient of variation of production around the trend line.⁷

⁶In some areas of Bangladesh cultivators grow a crop on extremely low land during winter by traditional irrigation, i.e., by *dhone*, swing buskets etc. This has not been taken into account because such irrigation is not of land augmenting type.

⁷Total production has been used instead of yield because natural risks also affect area planted. To account for any trend in production owing to acreage expansion or improvement in yields, a linear trend has been fitted by the OLS method on the ten yearly production figures for each district. The standard error of the regression equation measures the standard deviation of production fluctuation owing to natural risks. For comparison among districts this was expressed as a percentage of mean trend values.

The ordinary least square method⁸ has given the following results:

$$Y = 12.52 + 0.388 X_1 + 0.283 X_2 \quad R^2 = .11$$

(1.23) (0.04)

The sign of the coefficients indicate positive relationship of the incidence of share tenancy with both the level of natural risks and the wage rate. But the model explains only 11 per cent of the variation in the incidence of share tenancy and the value of the regression coefficients are not significantly different from zero as indicated by the estimated 't' values given in the parentheses.

III. STRUCTURAL FACTORS

Thus the traditional hypotheses do not adequately explain the existence and regional variation of tenancy in Bangladesh. In this section, it will be argued that a part of the explanation could also lie in the nature of rice agriculture and of the property distribution. This is because the two aspects of property distribution, e.g., the degree of inequality in the distribution of land among cultivators and the importance of landless workers available for wage employment, can affect the landowner's choice between ownership cultivation and tenancy.

With traditional technology monsoon dependent rice cultivation is marked by excessive seasonality of agricultural activities. Because of the seasonality of agriculture, the number of workdays required during a year is difficult to estimate beforehand, and the expected number of days may not be high enough to employ workers on a permanent basis.⁹ Thus, one finds the labour market to be basically casual in nature, i.e., wage workers are hired on a daily basis when family workers cannot cope with the job.¹⁰ Some cultivators do keep hired permanent workers but primarily for minding cattle or for doing heavy field work and supervising casual workers. In this situation peak season labour shortage adds to the cost of cultivation for those highly dependent on labour market and thus encourages farming with family labour rather than with hired labour.

⁸In this case the dependent variable has a limited range; the values lie within 0 and 100. The property of the ordinary least square method that the disturbance term is normally distributed is then violated, because the normality of distribution of the disturbance term implies that the dependent variable can take any value between plus infinity and minus infinity [4, p. 248]. A proper method in this case is probit analysis. But as it is a large sample technique and we have only 16 observations we had to use the OLS method. A check on the predicted values however revealed that all of them lie within 0 and 100.

⁹The results from our survey show that even in farms which used considerable amount of labour from the permanently hired workers, a full-time worker was employed, on average, for only 130 days in the year 1973/74 in crop production activity.

¹⁰For example, in India the Agricultural Labour Enquiry conducted in 1950/51 and 1956/57 revealed that respectively 90 and 73 per cent of the agricultural labour households were dependent on casual labour [4, p. 21].

From the landowner's point of view, the cost of cultivation per unit of land may not be independent of the size of the holding and the number of family workers. Hiring of labour is associated with the problem of supervision, if it is to produce the same output as under cultivation with family labour. The cost of supervision (or otherwise the loss in production) is expected to vary with the number of family workers, and the size of cultivated holding. Given the number of family workers, the higher the size of the holding, the higher would be the requirement of casual workers and the higher the supervision costs. The cost of supervision may also depend on the nature of the work done by family workers. A cultivator who has no experience of field work cannot make the hired workers work as intensively as one who actively participates in field work with the hired workers.

More important is the consideration that those who choose to rely on hired workers may not be able to find the right number of workers at the right moment. Since rainfall arrives on every farm at once in the area over which labour is mobile in the short run, every cultivator becomes busy simultaneously. Each bids labour away from the other, knowing that his requirement for labour for any given operation will be higher if the operation is delayed. The very small holder wage labourers enter the labour market only after completing the job on their own farm. Thus, in peak periods workers for wage employment may fall short of their demand depending on the proportion of landless and near landless agricultural households (who are available for wage employment) and the degree of inequality in the distribution of land among cultivators (which determines the demand for wage labour) in the area.

The pressure of demand for casual workers at certain critical periods of operation could be eased through substitution of labour by machines. But labour saving machines are hardly used in Bangladesh agriculture. Thus the seasonality factor can set a limit to the size of the farm that can be intensively cultivated with hired workers. Given the number of family workers, after a certain point the cost of cultivation per unit of land would be a positive function of the amount of land cultivated, and ultimately a point would be reached when it may be more profitable under the existing share rental and the wage rate, to get the additional land cultivated by someone who has a high worker/land ratio.

A landowner with excess labour may also prefer renting in land to employ that labour himself, instead of hiring it out. There may be several reasons for this preference. First, he may not be certain about selling his excess labour in the market because of the casual nature of employment. How much labour he can sell would depend on various unforeseen circumstances caused by the vagaries of nature and on the cultivators' decisions. In addition it is hazardous

to find a job everyday. But if land is rented in, labour can be used in one's own way. And, at low levels of income when physical existence is at stake, it is natural for one to avoid risk.¹¹ Secondly, casual employment implies a standard time of work whereas one can work for a longer time on one's own farm. Last but not least, for psychological and social reasons already mentioned, one may prefer self employment to wage labour.¹² An owner cultivator who has some surplus labour but does not want to hire it out, can use it if he rents in land. These factors, together with the limited availability of non-agricultural jobs, make the opportunity cost of family labour very low for those in possession of surplus labour.

If the opportunity cost of family labour is lower than the market wage rate and is a function of the availability of surplus labour in the family, the terms of share tenancy can permit large landowners to extract more surplus than is possible through cultivation with hired labour.¹³ The cultivator with higher worker/land ratios would use more labour, and as labour is the major input under traditional technology, he may produce higher output on a given piece of land.¹⁴ Under share tenancy the actual output is shared according to a fixed proportion and the labour cost is borne entirely by the tenant. Thus, the landlord can share in the fruits of additional application of labour by a tenant in possession of surplus labour, by leasing out land to him under the crop-sharing arrangement.

To summarise, sharecropping can be a preferred arrangement for large landowners farming in a specific institutional setting; it can ease the pressure of demand for casual workers which might otherwise have existed (depending on the nature of property distribution in the area) if the large landowners were entirely dependent on the labour market for cultivation. Supply of labour may increase because (i) some of the excess labour power which would not alternatively be offered in the market, may be used through tenancy, (ii) during busy periods, a self employed worker may put in more labour than a wage-worker, and (iii) some of the labour lost for seeking jobs (it can be quite high because of the casual nature of employment) could be utilised if the land had been in the possession of

¹¹For a theoretical discussion on the effect of uncertainty in the labour market on the choice of rental contract in peasant agriculture see [12, pp. 127-32].

¹²That sharecroppers enjoy superior status than the wage labourers in the South Asian societies is supported by many studies. Some of them are quoted in [11, footnote 1, p. 1058].

¹³This is also argued by some Marxian scholars to explain the sluggish development of capitalism in Indian agriculture [9; 13]. But their explanation is that the overpopulation and unemployment in the countryside enables the landowners to extract usurious rent from the poor peasants who cling desperately to their little plot of land and compete with each other for tenancy.

¹⁴Indeed, it is found in many empirical studies that small holder tenants are more land productive than large owners farmers. See for example [6].

the labourer. Total number of workers could also increase if some of the family members who do not enter the labour market (such as students) are available for work in the family farm during busy periods.

The following hypothesis could be used to test the validity of the above arguments. At the micro level our hypothesis is that the amount of land rented (both out and in) by a farm would be related to the land and labour endowments of the family. Those who have surplus land (i.e., more than can be intensively cultivated with family workers) would rent out land to those in possession of surplus labour. The amount of land rented out would be positively related to the amount of surplus land because, given the scarcity of labour during peak periods, the larger the amount of surplus land the more would be the cost of cultivation. Further, the amount of land rented in by a share tenant would be positively related to surplus labour in the tenant family, because the rental share being fixed the landlord can increase his rent by giving more land to the tenant who has a higher amount of surplus labour. The closeness of the association between the amount of land rented and land and labour endowment of the family would depend on the demand for casual workers in the area, which in turn depends on the degree of inequality in the distribution of land among cultivators and the proportion of families supplying casual labour. The lower the former and the higher the latter, the less would be the shortage of labour during peak periods, and hence the less would be the need for renting out land on this account.

Some other factors can also affect tenancy at the micro level. One is the indivisibilities in the draft animal unit. Because of seasonal pressure, every cultivator has to own a minimum unit (a pair) irrespective of the amount of land cultivated. Thus, to a very small owner cultivator, an additional acre of land is almost costless to cultivate as far as the animal labour cost is concerned. This can also affect the decision to rent in land by a farm. Another factor which is commonly observed in Bangladesh agriculture and can affect the postulated relationship between land distribution and tenancy, is the practice of land transactions among relations. If one wants to help a poor relative one may not take into account how much surplus labour or surplus capital one has. Also many absentee or non-cultivator owners who have problems of detecting actual yield, may be interested in getting a fair share of the produce rather than a better yield on the rented land. Thus, they can give land to one whom they trust, irrespective of his factor endowments. Finally some plots of land may be rented out on the grounds that they would be uneconomic for the owner to cultivate because of their distance from the household. This variable however, is difficult to measure quantitatively and will not be taken into account in the empirical analysis.

IV. INVESTIGATION AND RESULTS

The hypothesis suggested in the previous section, that the nature of land distribution is an important variable in explaining tenancy is tested here with both micro and macro data. First, we study the relationship between the amount of land rented and factor endowments in individual farms in the two survey areas. These areas have dissimilar patterns of land distribution and so, a comparison of results helps to assess the impact of the nature of land distribution on tenancy. Second, we study the relationship directly, using macro level data on incidence of tenancy and the nature of land distribution for 16 districts of Bangladesh.

(A) Results of Micro Level Investigations

Measurement of Land and Worker

Land is measured in acres and only that portion of land holding or land owned is taken into account which was used for cultivation. The 1974 survey gives information on the number of family members working full-time and part-time on the farm. In measuring farm workers, the part-time workers are given .25 weights of the full-time workers. The permanently hired workers attached with the farm family are treated as full-time workers and are included in the family farm workers because they have characteristics similar to family workers, i.e., they are available for work at any time and once contracted they have to be paid irrespective of whether they are used in some work or not. Efficiency of workers may vary with their age/sex difference but this factor has not been taken into account.

The 1969/70 survey did not collect information on the working status of the family members and so a direct measurement of farm workers is not possible. An indirect estimate is made here from the information on the age/sex distribution of the family members working in different operations of the major crop, the *aman* paddy. In one area (Phulpur), the population are orthodox Muslims and the women observe strict 'purdah'. So, here we estimated the full-time working members by the number of male members over 12 years of age excluding those who go to school or have completed high school level education. These latter male members are taken as part-time farm workers. In the other area (Thakurgaon) a considerable proportion of the population are tribal Hindus who have no religious ban on their women working outside home. Since, for this area, estimating farm workers from the adult male unit would be misleading, we have estimated family farm workers by the maximum number of family members working in harvesting and transplanting of *aman* paddy.¹⁵ Again male members over 12,

¹⁵ *Aman* occupies about 60 per cent of the total land in this area, and the transplanting and harvesting time of this crop are the busiest periods of agricultural operation.

who go to school or have completed high school level education have been treated as part-time workers.

Factor Endowments in Different Tenurial Groups

All farms under survey are classified into four groups according to their tenurial status ; a) the cultivator landlords, those who cultivate a part of their owned land and rent out a part, b) pure owner cultivators, who neither rent in nor rent out any land, c) tenant cultivators with less than 50 per cent of their holding rented in and d) tenants who rent in 50 per cent or more of their holding. The numerical strength of these various groups and their average endowments of land (both owned and cultivated) and worker are presented in Table II.

One can see from the table that there is a positive relationship between worker/land ratio and tenancy in all four cases. The landlord cultivators had the highest amount of land/worker ratio while the pure owner cultivators occupied the middle position. Also, tenants who had more land to cultivate per worker rented in less land. Land transfer through tenancy corrected to some extent this difference in initial factor endowments. But even after the transactions, the tenant farms had more favourable worker/land ratio than the pure owner and the landlord cultivators. That the amount of land rented in is positively related with the number of farm workers and negatively related with the size of owned land in the farm family can also be seen from a two-way contingency table presented in the appendix (Appendix Table II).

Regression Analysis

Our hypothesis suggests the following relationship to hold at the farm level:

$$T = b_0 + b_1N + b_2A_0 + u$$

Where, T is the amount of net rented-in land (its value is positive for tenants, 0 for pure owner cultivators, and negative for landlord cultivators), N is the number of workers on the farm (family plus permanently hired workers), and A_0 is the amount of owned cultivable land. The coefficient b_1 is expected to be positive, because among cultivators with the same value for A_0 , the one with the higher value for N would have more surplus labour (or less surplus land) and hence would get more land from the tenancy market (or rent out less land). Similarly, given N , the higher the value of A_0 the less the amount of surplus labour in the family (or more surplus land), and the lower would be the value of T . Thus, b_2 is expected to be negative.

It was suggested that the surplus draft animal unit after cultivating owned land can also influence the amount of land rented in by the tenants. This variable,

TABLE II

FACTOR ENDOWMENTS (LAND AND WORKER) IN DIFFERENT TENURIAL GROUPS

Tenurial Groups	No. of Farms	Owned Land (cultivable)	Cultivated Land	No. of Workers	(3)/(5)	(4)/(5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Phulpur 1969/70						
Owner Cultivators						
a) Landlords	22	6.96	5.85	2.53	2.75	2.31
b) Others	32	3.76	3.76	1.89	1.99	1.99
Tenants						
a) With < 50% Rented holding	45	3.10	4.03	2.39	1.30	1.69
b) With ≥ 50% Rented holding	23	0.90	3.27	2.26	0.40	1.45
Phulpur 1973/74						
Owner Cultivators						
a) Landlords	8	9.40	6.83	2.16	4.36	3.16
b) Others	66	3.74	3.74	2.14	1.75	1.75
Tenants						
a) With < 50% Rented holding	27	2.44	3.31	2.80	0.87	1.18
b) With ≥ 50% Rented holding	16	0.42	1.84	2.03	0.21	0.91
Thakurgaon 1969/70						
Owner Cultivators						
a) Landlords	34	11.19	6.83	2.94	3.81	2.32
b) Others	37	4.98	4.98	2.51	1.98	1.98
Tenants						
a) With < 50% Rented holding	43	2.67	3.73	2.16	1.24	1.73
b) With ≥ 50% Rented holding	31	0.86	3.42	2.48	0.35	1.38
Thakurgaon 1973/74						
Owner Cultivators						
a) Landlords	21	10.41	6.32	2.65	3.93	2.38
b) Others	23	3.04	3.04	2.06	1.48	1.48
Tenants						
a) With < 50% Rented holding	26	3.11	4.07	2.50	1.24	1.63
b) With ≥ 50% Rented holding	27	0.63	2.87	2.26	0.28	1.27

however, could not be included in the regression equation because of the complementary nature of the human and animal labour. Animals cannot be used without the help of human labour and so, inclusion of both surplus worker and surplus animal unit as explanatory variables in the same equation would create problems of multicollinearity.

The OLS method applied on the cross-section of all farms has produced the following results for the above model.¹⁸

Thakurgaon

$$1969/70 : T = 0.12 + 1.184 N^* - 0.618 A_0^* \quad R^2 = 0.78$$

(9.27) (-22.31)

$$1973/74 : T = 0.49 + 0.852 N^* - 0.629 A_0^* \quad R^2 = 0.81$$

(7.70) (-19.72)

Phulpur

$$1969/70 : T = 0.49 + 0.389 N^* - 0.274 A_0^* \quad R^2 = 0.32$$

(4.14) (-7.54)

$$1973/74 : T = 0.07 + 0.475 N^* - 0.274 A_0^* \quad R^2 = 0.61$$

(7.23) (-12.82)

Figures in the parentheses are estimated 't' values for regression coefficients and * denotes that the coefficient is significantly different from zero at 1 per cent probability error.

The results indicate that tenancy at the farm level is significantly related with land and labour endowments of the family. The coefficients of N and A_0 have expected signs, and their values are significantly different from zero at one per cent probability error. The value of R^2 indicates that a very high proportion of the variation in tenancy among farms is explained by the model (except in the case of Phulpur 1969/70). The value of R^2 for different cases under study also indicates that the association between the factor endowment of the family and tenancy is stronger for Thakurgaon than for Phulpur.

The model fitted on the cross section of cultivator landlords with T_0 , the amount of land rented out, as the dependent variable gave the following results:

¹⁸It is argued that in cross-section studies, the assumption of a constant variance of the disturbance term (homoscedasticity) may be unrealistic because the residual variance can increase with the size of the independent variable (income or size of farm) and in that case the OLS estimator will be inefficient [8, p. 214-217]. To check the possibility that in our case the residual variance may increase with the size of the owned land, we applied the Goldfield-Quandt parametric test for the absence of homoscedasticity. In every case the result was negative,

Thakurgaon

$$1969/70 : T_0 = 0.79 - 1.82 N^* + 0.713 A_0^* \quad R^2 = 0.69$$

(—3.98) (8.01)

$$1973/74 : T_0 = 0.004 - 1.025 N^* + 0.661 A_0^* \quad R^2 = 0.71$$

(2.68) (6.17)

Phulpur

$$1969/70 : T_0 = 0.47 - 0.023 N + 0.117 A_0^* \quad R^2 = 0.26$$

(—0.18) (2.21)

As before, the values in the parentheses are estimated 't' values for regression coefficients. The results indicate that the amount of land rented out by the landlord is positively related with the amount of owned land of the family, and negatively related to the size of working members. For Thakurgaon, the value of the coefficients differ significantly from zero, and the model explains about 70 per cent of the variation in the amount of land rented out among cultivator landlords. For Phulpur, for the reference year 1969/70, the estimation gives expected sign of the coefficients but the relationship is weak as can be seen from the values of R^2 and 't'. For 1974, the model was not fitted because of a very small number of observations ($N=8$).

The model was also fitted on the cross-section of tenants, with the amount of land rented in, T_1 , as the dependent variable. The following results were obtained.

Thakurgaon

$$1969/70 : T_1 = 0.64 + 0.750 N^* - 0.307 A_0^* \quad R^2 = 0.44$$

(6.97) (—4.04)

$$1973/74 : T_1 = 0.60 + 0.768 N^* - 0.419 A_0^* \quad R^2 = 0.46$$

(6.30) (—4.51)

Phulpur

$$1969/70 : T_1 = 1.15 + 0.318 N^* - 0.228 A_0^* \quad R^2 = 0.17$$

(2.52) (—3.40)

$$1973/74 : T_1 = 0.45 + 0.361 N^* - 0.162 A_0^* \quad R^2 = 0.20$$

(3.06) (—1.71)

The results indicate that factor endowments in tenant families do play an important role in determining how much land they can get from the tenancy market. The amount of land rented in is significantly related to the size of family

workers and the amount of owned land, which together determine the amount of surplus labour in the tenant family. The regression coefficients have expected signs, and their values are significantly different from zero at 1 per cent probability error except that of owned land for Phulpur 1973/74. Again, the relationship is found to be stronger in Thakurgaon than in Phulpur, as the values of R^2 indicate.

The 1974 survey provides information on land transactions among relations in the tenancy market. To see whether kinship plays any role in determining the amount of land rented to a tenant, a dummy variable was included in the above model, with the value 1 for cases where land was rented from a relative and 0 for other cases. The following results were obtained:

Thakurgaon 1973/74

$$T_1 = 0.46 + 0.602 D^* + 0.785 N^* - 0.471 A_0^* \quad R^2 = 0.50$$

(2.08) (6.65) (—5.04)

Phulpur 1973/74

$$T_1 = 0.36 + 0.606 D^* + 0.328 N^* - 0.198 A_0^* \quad R^2 = 0.36$$

(3.17) (3.06) (—2.30)

The inclusion of D , the dummy variable, improves the explanatory power of the model significantly. In both cases, the sign of the coefficient of the dummy variable is positive, which indicates that among tenants with the same factor endowments of the family, a relation of a landlord gets more land than a non-relation. The value of the coefficient is significantly different from zero in both cases. A comparison of the value of R^2 of this model with the earlier one, however, indicates that this social factor was relatively more important in Phulpur than in Thakurgaon.

Finally, the size of household, F , was added as another explanatory variable to see whether consumption requirement of the tenant family was an important factor affecting the amount of land rented in. The estimated results are given below :

Thakurgaon

$$1969/70 : T_1 = 0.61 + 0.735 N^* - 0.313 A^* + 0.011 F \quad R^2 = 0.44$$

(5.70) (—3.91) (0.22)]

$$1973/74 : T_1 = 0.73 + 0.680 D^* + 0.861 N^* - 0.473 A_0^* - 0.058 F$$

(2.41) (6.27) (—4.88) (—1.11)

$R^2 = 0.51$

Phulpur

1969/70 :	$T_1=0.78+0.165N$	$-0.283A^*$	$+0.110F^*$	$R^2=0.23$
	(1.18)	(-4.06)	(2.23)	
1973/74 :	$T_1=0.31+0.629D^*+0.286N^*$	$-0.224A_o^*$	$-0.024F$	
	(3.21)	(2.31)	(-2.37)	(0.68)
				$R_2=0.37$

The results show that the size of household is not an important factor affecting the amount of land rented in by the tenant in three out of four cases. In fact in two cases the sign of the coefficient is negative indicating that tenants with larger size of households got less land from tenancy market which is contrary to the hypothesis that the tenant with greater requirement of family consumption (if household size can be taken as a proxy of this variable) would hire in more land. In no case, however, the value of the coefficient is statistically significantly negative. One explanation for this result might be that the tenant has little say in the market as to how much land he can rent in. This is decided by the landlord. It is the interest of the landlord to give more land to tenants with more surplus labour and he does not care about the consumption requirement of the tenant family.

The finding that at the farm level the model gives better result for Thakurgaon than for Phulpur can be explained in terms of the difference in the nature of property distribution in the two areas. In Thakurgaon the distribution of land among cultivators was more unequal and the proportion of landless households was lower compared with Phulpur (Table III.) Thus if land was not redistributed through tenancy, the pressure of demand for casual workers would have been higher in the former area compared to the latter, and the cost disadvantage of a given flexibility in worker/land ratio on the farm would have been higher. The stronger relationship of tenancy with land and labour endowment of family in Thakurgaon compared with Phulpur is thus in conformity with the hypothesis at the macro level. The evidence that cultivators of Thakurgaon depended on permanently hired workers (to avoid at least partially the risk of cultivation associated with dependence on casual labour) relatively more than their counterparts in Phulpur did also lends it support.

TABLE III

NATURE OF LAND DISTRIBUTION AND IMPORTANCE OF HIRED LABOUR

Variables	Phulpur		Thakurgaon	
	1969/70	1974	1969/70	1974
Concentration of land-ownership among cultivators (Gini Coefficient)	0.46	0.47	0.52	0.53
% of landless households	n.a.	29.1	n.a.	19.4
% of hired permanent workers	9.7	11.5	15.5	16.3
% of casually hired labour input	34.8	28.5	17.1	15.6

n.a. : information not available from the survey.

(B) Results of Macro-level Investigations

Investigations with farm level data from two areas in Bangladesh supported the view that the nature of land distribution can be an important factor in explaining tenancy and its variation over space. To see how general this relationship is, we have drawn information on the nature of land distribution and the incidence of tenancy for 16 districts of Bangladesh for 1960. The data is presented in Appendix Table I.

The following regression model was fitted on the data.

$$Y = b_0 + b_3 X_3 + b_4 X_4 + u$$

Where, Y is the incidence of tenancy, X_3 is the degree of inequality in the distribution of land among cultivators and X_4 is the importance of casual workers in the district.

As in Section II, Y was measured by the amount of land cultivated under sharecropping arrangement as a percentage of all land cultivated. Information on the distribution of owned land is not available. The 1960 Census of Agriculture reported the distribution of cultivated land in size groups of farms and the distribution of workers (full time and part time workers and permanently hired

workers) in these size groups. Inequality in the distribution of cultivated land cannot be taken as a measure of the degree of inequality of the distribution of owned land, because the higher the incidence of tenancy, the higher would be the difference between them (under our assumption that land is transferred from the larger to the smaller owners) and thus, the regression results would be systematically biased. To reduce this bias we used the distribution of owned cultivated land obtained by subtracting the amount of rented in land from the cultivated land in each size group. As the number of workers varies among size groups of farms, the amount of owned cultivated land was standardised by this variable. The degree of inequality was measured by the coefficient of variation of land per worker among farms holding 2.5 acres or more.¹⁷ Farms holding less than 2.5 acres were not considered because they are only marginal labour hirers and many of them hire out labour more than they hire in.

The importance of workers available for casual employment has been measured from the information provided by two sources. The general Census of 1961 reported the proportion of landless agricultural labour force. This was added to the percentage of near landless workers i.e., those holding less than 0.5 acres, as reported in 1960 Census of Agriculture. This gives us the percentage of workers available either for permanent or for temporary employment. The percentage of workers actually employed on a permanent basis was then subtracted to get the percentage of workers available for casual employment.

The ordinary least squares method produced the following estimates:

$$Y = 3.82 + 0.552 X_3^* - 0.262 X_4^* \quad R^2=0.58$$

(3.68) (-2.59)

As before, the estimated 't' values are given within parentheses below the value of the coefficients and * denotes that the value of the coefficient is significantly different from zero. The value of R^2 indicates that about 58 per cent of the variation in the incidence of share tenancy among the districts is explained by these two variables.¹⁸

¹⁷Alternatively the degree of inequality could be measured by the Gini Coefficient. We tried to incorporate the estimated Gini coefficients in the regression equation. But we faced estimation problems because of very little variation in this variable (the Coefficient varies from 0.29 to 0.41; the variation was 11% around the mean, as against 20% variation in the alternative explanatory variable and 30% variation in the dependent variable).

¹⁸The percentage of cultivated land under all rental arrangement was also used as the dependent variable, and the following result was obtained :

$$Y = 2.49 + 0.590 X_3^* - 0.176 X_4 \quad R^2 = 0.61$$

(4.28) (-1.89)

The level of natural risks, X_1 , and the money wage rate, X_2 , (the variables whose association with Y was tested in Section II) were then included in the above model. The estimates are:

$$Y = 10.36 + 0.251 X_1^{**} - 8.25 X_2 + 0.663 X_3 - 0.256 X_4^* ; R^2 = 0.76$$

(1.99) (-1.79) (4.88) (-3.08)

**denotes that the coefficient is significant at 5 per cent probability error. The inclusion of these variables improves the explanatory power of the model. The land distribution variable has remained significant as before; in fact, the estimated 't' values of the coefficient of these variables have increased as a result of the inclusion of these new variables. The risk variable which was found to be insignificant in Section II, has now come out to be significant at 5 per cent level.

The coefficient of the wage rate in the above equation is difficult to explain. Contrary to the expectation of Bardhan and Srinivasan [1] the sign of the coefficient is negative, and there has been a drastic change in the value of the coefficient compared with the model fitted in Section II. One can argue that this results from multicollinearity between the wage rate and both X_3 and X_4 . A closer look at the value of correlation coefficients between these variables and the regression coefficients, and their standard errors in stepwise regressions, indicated that this was not a serious problem.¹⁹

The result may support Newbery's criticism [12, pp. 120-26] of the Bardhan-Srinivasan model. He argued that one could not unambiguously predict from their model the direction of the change in the area of land leased in response to a parametric change in the wage rate. He showed that in the model

¹⁹The correlation coefficient between X_2 and X_3 was 0.43 and the multiple correlation coefficient between X_2 and X_3 and X_4 was 0.47 which is not high enough to cause serious problems of multicollinearity. This can also be seen from the following stepwise regression equations :

$$\text{i) } Y = 21.16 - 1.02 X_2 \quad R^2 = 0.001$$

(7.49)

$$\text{ii) } Y = 1.09 + 0.506 X_3 \quad R^2 = 0.37$$

(0.177)

$$\text{iii) } Y = 14.21 - 10.37 X_2 + 0.640 X_3 \quad R^2 = 0.48$$

(6.24) (0.189)

Figures within brackets are the standard errors of the estimated coefficients. In the presence of multicollinearity, the standard errors of the estimates in the three variable model would have been much higher and the value of R^2 would not have increased.

the amount of land leased was completely determined by the landlord. Thus, although an increase in the wage rate would lower the attractiveness of owner farming, it might not eliminate the tenant's excess demand for land. The final outcome would depend on the relative strength of the two effects.

One can also argue that the incidence of tenancy determines the wage rate rather than being determined by it. The higher the amount of land rented out, the lower would be the dependence on the labour market for cultivation. And, if the demand for labour is reduced more than its supply, the wage rate would fall. If land transferred through tenancy utilises a part of the surplus labour which is not offered in the market, this result is quite plausible.

V. CONCLUSIONS

Dislike of self-cultivation sustained by social contempt for manual labour, and the many socio-economic incentives for keeping possession of land do not fully explain the existence of tenancy in Bangladesh agriculture. The results of a farm survey in Bangladesh in 1974 indicate that absentee and resident non-cultivator landlords who might have been motivated to rent out their ownership holding because of such considerations, had a share of only 42 per cent of the tenancy market. The rest of the land was supplied by those who were themselves cultivators.

It has been argued in this paper that the explanation of why landlord-cultivators rent out a part of their holding instead of cultivating it with additional hired labour, may lie in the nature of rice agriculture and of land distribution. Worker/land ratio of a cultivator family cannot be infinitely flexible in a monsoon dominated rice-agriculture because of seasonal irregularities of activities. The flexibility can entail additional costs arising out of supervision of casual workers, and the bidding up of wage rates at peak periods. These costs would vary among cultivators depending on worker/land ratio of the family, and among localities, depending on the nature of land distribution which determines the demand and supply of casual labour. On the other hand, households who own more land than can be economically cultivated by family workers, can gain by leasing out land under crop-sharing arrangements to tenants in possession of surplus labour. As the opportunity cost of such labour is lower than the wage rate, the tenant is expected to use more labour on his own farm, and under the terms of share tenancy the landlord can get a share of the additional product without bearing any cost.

The discovery of a positive relationship of the extent of tenancy with land and labour endowments of tenant families gives empirical support to the argument. Also, stronger association is found in the area with more unequal distribution of land among cultivators and lower proportion of landless households, which indicates that the nature of land distribution is an important factor affecting incidence of tenancy in various localities.

The cross-section data (1960) for 16 districts of Bangladesh does not refute the hypothesis. The incidence of share tenancy is found to be positively related with the proportion of workers available for casual employment. The state of natural risks, which is usually offered as an explanation of the variation in the incidence of share tenancy over space, do not explain much of the variation in Bangladesh. But, when used along with the land distribution variables, it emerges as a significant factor affecting the incidence of share tenancy.

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Appendix

TABLE I
DISTRICT LEVEL DATA

District	% of Cultivated Land Under		% of Near Landless Worker	% of Workers Permanently Employed	Coefficient of Variation		Wage Rate (taka) Per Day
	Tenancy	Share Tenancy			In Land Per Worker	In Out-put Over Time	
Dinajpur	29.83	28.78	19.39	8.09	50.8	18.5	2.11
Rangpur	17.91	16.47	23.20	6.78	36.4	13.8	1.92
Bogra	17.80	14.53	23.44	9.13	33.7	12.4	2.02
Rajshahi	29.29	28.83	32.12	8.37	41.3	14.5	2.10
Pabna	23.61	21.90	36.61	8.94	44.8	19.3	1.97
Kushtia	24.81	24.30	24.51	16.25	34.0	13.8	1.60
Jessore	20.40	20.16	24.29	6.33	36.3	17.5	1.70
Khulna	28.57	24.30	36.75	10.76	37.3	25.6	1.87
Bakerganj	25.51	19.70	49.63	9.64	47.1	7.9	1.62
Mymensingh	19.24	17.05	29.50	6.87	36.3	13.7	2.16
Dacca	17.80	14.20	37.84	6.11	36.9	25.4	2.04
Faridpur	19.72	18.09	44.47	4.17	39.3	23.2	1.90
Sylhet	12.01	10.72	28.05	10.82	35.1	7.1	2.30
Comilla	8.23	4.40	49.81	4.47	24.9	11.0	1.85
Noakhali	18.54	15.06	50.68	4.82	47.0	13.0	2.30
Chittagong	29.69	25.24	43.03	10.53	58.5	12.0	2.42

Sources : Estimates from figures provided by

- Govt. of Pakistan, *The 1960 Census of Agriculture* Vol. I, 1962
- Govt. of Pakistan, *Census of Pakistan* 1961; East Pakistan, Karachi, 1962
- Govt. of Bangladesh, *Bangladesh Agricultural Production Levels* (1947-76), Dacca, 1976
- Bureau of Statistics, "District-wise Monthly Wage Rates of Agricultural Workers," (mimeo.), Dacca, 1972.

TABLE II

THE AMOUNT OF NET RENTED-IN LAND BY SIZE OF
LANDOWNERSHIP AND NUMBER OF WORKERS

(Figures in acres)

Cases	Size of Land Owned (in acres)	Number of Workers			
		Upto One	Two	Three	Four & Above
Phulpur 1969/70	Less than 2.0	0.29	1.45	2.03	3.28
	2.0 to <5.0	-0.09	0.69	0.88	1.60
	5.0 and above	-1.63	-0.64	-0.46	0.49
Phulpur 1973/74	Less than 2.0	0.40	0.63	0.63	2.03
	2.0 to <5.0	-0.37	0.04	0.10	1.05
	5.0 and above	*	-0.98	-0.82	0.33
Thakurgaon 1969/70	Less than 2.0	0.94	1.52	2.56	3.58
	2.0 to <5.0	-0.34	0.55	2.04	3.13
	5.0 and above	-3.43	-2.11	-1.86	nil
Thakurgaon 1973/74	Less than 2.0	0.79	1.37	2.15	2.69
	2.0 to <5.0	0.40	0.83	1.38	3.33
	5.0 and above	-4.70	-2.54	-0.85	-3.89

*There is no observation in this group.

Labour Force Analysis : Bangladesh, 1974

by

A. F. MD. HABIBUL HUQ*

The behavioural pattern of Bangladesh labour force is characteristically rural, agrarian, bearing distinct marks of age-sex-regional differentials: inter-censal comparisons reveal no significant rural-urban redistribution or its re-structuring among fields of economic activity during 1961-74. The expected male working life compares favourably with the pattern prevalent in selected developing countries, despite a heavier toll of mortality. Estimated statistics of male labour force dynamics reveal that 71.64% of the entries occur by age 15, death claims 55.6% of the annual depletion below age 55, whereas 53.5% of the retirements occur at age 75 and above. The estimated labour force replacement ratio implies that for every 100 depletions, 275 new entries or 175 net additions take place annually. The current back-log of un- and under employed labour force is estimated at around 9.5 million. The socio-economic-geo-demographic realities make it inevitable that vast majority of the surplus labour force will have to be productively employed within a rural set-up. Basic changes in production relations is to be brought about by building socio-economic infrastructure that will engender small family norm from work-force point of view by gainfully employing that adult working population through optimum exploitation of its productive potentials. A comprehensive policy framework for Bangladesh should incorporate the essentials of an integrated labour force and population policy taking cognizance of the inter-relationship of the economic-demographic variables that regulate the demand and supply of labour force on both quantitative and qualitative perspectives.

I. INTRODUCTION

The objective of this study is to present a labour force analysis of Bangladesh, 1974, within the limitations of available data. Section II outlines the concepts, definitions, source of data and their limitations. Section III presents the dominant characteristics of the behavioural pattern of economic activity in the perspectives

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of age-sex-rural-urban differentials, including some relevant international comparisons. Section IV is concerned with the structural pattern of the labour force, including inter-censal comparatives. Section V presents abridged tables of economically active life, separately for males and females. It also assesses the relative position of the expected length of working life and the toll of mortality in Bangladesh *vis-a-vis* some selected countries, and attempts a comparison of the length of male working life in 1974 with the 1962/63 level. The components of annual change in the actual male labour force of Bangladesh, net annual addition to the labour force and its rate of natural increase are estimated. A brief summary and some concluding remarks are offered in Section VI.

II. CONCEPTS, DEFINITIONS, DATA AND THEIR LIMITATIONS

The population census of Bangladesh, 1974 [11; 12], and the population census of Pakistan, 1961 [18; 19; 20] form the main source of data for this study. These two censuses sought data on economic activity from persons aged 10 years and above.¹ A reference period of one week was used for the non-agricultural labour force, but the restriction was not maintained for the agricultural labour force. The concepts and definitions used to generate basic data² on economic activity, employment and unemployment conform fairly well with the internationally accepted standards.³ A person was included in the labour force if he/she was reported as cultivator, or as having engaged in other agricultural work or any other work as self-employed or for profit or to earn wage, salary or to help, without remuneration, any member of the family in the farm or non-farm work that earns wage or profit or an unemployed but having had looked for work to earn pay or profit during the reference period [12, pp. 147-48; 18, pp. V-1-17].

¹In 1974, children in the age-group 5-9 were also enumerated as part of the labour force, but these data have not been tabulated [11, p. 33].

²For relevant questions on economic activity in 1974, see census questions 20-27 [12, pp. 207-209].

³According to these standards, the measure of labour force should comprise all persons of either sex who furnish the supply of labour available for the production of economic goods, and services, including employers, self-employed persons, and those who assist, without pay in a family economic enterprises as well as employees. It further includes unemployed persons, as well as those employed during the period to which the data refer. The category of employed persons should comprise both full-time and part-time workers, provided that the latter work at least a minimum period, while the unemployed should be defined as persons who are not at work and are seeking work for pay or profit during the period of reference... the category of persons not in the labour force should comprise persons engaged only in activities which do not contribute directly to the production of economic goods and services; this includes housewives and students as well as disabled, retired and other inactive persons. It should be noted that housewives occupied only with domestic duties are to be excluded from the measure of labour force because the goods and services which they produce are not considered 'economic', just as the value of their products are excluded from the measure of income in national accounts [7, p. 3].

The conceptual framework used to distinguish between economically active and economically inactive persons fits well with the internationally recommended one, and thus permits comparability. But the use of such universalistic standards is not necessarily a good idea as they may fail to take into account the socioeconomic constraints that are peculiar to an underdeveloped country like Bangladesh. The criterion of distinguishing unemployed persons belonging to the labour force from economically inactive persons not in the labour force, on the basis of whether or not one was looking for pay or profit, is not suitable for use under the conditions of narrowly limited opportunities for employment which prevail in many developing countries, particularly in rural communities. In fact, so far as Bangladesh is concerned, "the criteria of having had looked for work in addition to remaining unemployed during the reference period, severely restricts the size of the reported unemployment. The knowledge of non-availability of suitable job opportunities also serves as a deterrent factor for not looking for work" [16, p.10]. To compound the problem, no reference periods used in case of the agricultural labour force that experiences widespread endemic underemployment outside seasonal peaks of activity [1; 9; 14; 15]. These definitional shortcomings explain the extremely low unemployment figures of 2.4% and 0.5% in 1974 and 1961 census respectively [11, p. 38]. In view of the low production level in Bangladesh, the domesticated services of womenfolk may be of considerable significance, and the total exclusion of the housewives category from labour force status is not very realistic. The socio-economic setting in Bangladesh warrants re-evaluation of female economic activity.

The 1974 census underestimated the Bangladesh population by 6.88% [11, p. 8]. Since there is no means to ascertain the extent of under-enumeration in the data on economically active population, unadjusted age-specific data on both total population and economically active population have been used for this study. Under the assumption that under-enumeration acted in the same direction and in the same proportion for economically active as well as inactive population for each age-group, the activity rates would remain unaffected; but in view of the fact that economically active population are likely to be enumerated more extensively compared to inactive population like beggars, vagrants and the disabled, this assumption is not tenable on *a priori* reasoning.

Superimposed on this, is the bias⁴ of the respondents and the enumerators and the sampling error due to the fact that only 5% of the 'available'⁵ rural and

⁴Particularly because of digital preference in age-reporting.

⁵An unknown bias has been introduced by the 'non-availability' of some enumeration slips [11, p. 7].

20% of the urban enumeration slips on economic activity were processed by the census Authority [11, p. 7]. The data on economic activity are thus subject to both sampling and non-sampling errors.

The limitations of data and definitions, naturally effect the analytical findings and make it imperative to interpret them with caution.

III. ECONOMIC ACTIVITY RATES IN PERSPECTIVES OF AGE-SEX-RURAL-URBAN DIFFERENTIALS

Bangladesh is characterised by high economic dependency ratio of 248.4 persons for every 100 economically active persons, the corresponding rural and urban figures being 252.1 and 210.6 respectively. These are indicative of the measure of socio-economic burden created by those who consume without producing and have a bearing on the low crude activity rate (CAR) obtaining in Bangladesh. The Bangladesh CAR's for males and females are 53.0 and 2.5 for every 100 persons of all ages, of respective sex category, whereas the corresponding figures for less developed regions of the world in 1970, were 52.4 and 22.3 respectively [11, p. 37]. A comparison of the Bangladesh crude activity level with that of India reveals that whereas India, in 1971, had an economic dependency ratio of 204 per 100 economically active persons, the Indian male and female CAR's were 52.5 and 11.9 [17]. Obviously the low crude activity level in Bangladesh is attributable to a great extent to the relatively lower female participation.

Age-sex Specific Activity Rates : Bangladesh, 1974

The distributional pattern of age-specific male activity rates that emerges from Table I and Figure 1, is of fairly smooth unimodal type with peak participation registered in the age-group 35-44, as in case of Japan and the less developed Asian regions. However, the age-group 25-34 makes the maximum overall contribution (Column 10, Table I) of 17.40, as against the modal activity age-group's share of 15.29 to the Bangladesh male CAR of 80.35 per 100 males aged 10 years and above. With almost cent per cent participation in the adult working age-bracket, the age-specific activity level of Bangladesh is consistently higher than those of Japan and the less developed Asian regions. This high male activity level, characterised as it is by relatively higher young and old age participation, is consistent with the basically rural-agrarian set up of production relations in Bangladesh and has a direct bearing on widespread under-employment, both visible and invisible.

The age-curve of female activity for Bangladesh keeps a uniformly low level. It demonstrates an erratic behavioural pattern in the sense that it starts with the

highest activity rate of 6.35 at the base of the age-structure, falls to a minimum rate of 2.81 at age-group 25-34, then gradually rises to a second peak rate of 3.99 in the age-group 55-64. The age-curve of Japanese female activity is M-shaped, bimodal with modes around ages 20 and 45, typical of the developed country pattern, bearing distinct marks of age-differentials. The age-curve for the less-developed Asian regions, with its relative uniformity, demonstrates marks of age-differentials, though in a lesser degree. In sharp contrast the Bangladesh female activity or rather inactivity pattern, gives an impression of being almost invariant of age, at least at ages 20 onwards, the range of fluctuation being 1.18 only. Of course if the scale of reference is enlarged, the fluctuations appear more pronounced, reminiscent of the 'patently erratic see-saw pattern of female activity' witnessed in many countries [7, pp. 18-19]. The socio-cultural constraints and the economic-demographic characteristics interacting on the female life-cycle, coupled with the fact that housewives are treated as economically inactive, may explain this erratic behaviour in Bangladesh female activity. But more of this later.

Before giving a fuller treatment of the predominant age-sex characteristics of the economic activity pattern in Bangladesh, let us consider the rural-urban differentials and the age-standardised activity rates, as presented in Tables II and III.

Rural-urban Differentials

In 1974, rural population constituted 91.22% of the total population and the rural labour force contributed 90.16% to the total labour force of Bangladesh. The sex-ratios for persons aged 10 years and above, in Bangladesh as a whole, in rural and urban regions are 112 males, 109 males, 144 males respectively per every 100 females. The corresponding figures for the economically active populations of the three categories are 2254 males, 2311 males and 1830 males per every 100 females. These ratios establish the extent of the overwhelming male burden of economic activity in Bangladesh irrespective of regional stratification. The Bangladesh age-sex differential pattern is more or less duplicated in the rural participation behaviour. Males constitute higher proportion of the urban population as compared to the rural population, but in economic activity, the urban females fare proportionately better than their rural counterparts. The rural-urban differential with respect to age-specific activity pattern is more pronounced at the base and apex of the age-structure of economically active population, obviously because of rural-urban structural difference in employment opportunities.

TABLE I

AGE-SPECIFIC ACTIVITY RATES OF BANGLADESH MALES AND FEMALES, 1974

Age Group	Total Population in '000		Economically Active in '000		A.S. Activity * Rates per 100		A.S. Per Cent Distribution of Total Population		A.S. Overall Contribution to CAR	
	M	F	M	F	M	F	M	F	M	F
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)= (6).(8) 100	(11)= (7).(9) 100
10-14	4986.5	4194.3	2087.1	266.3	41.85	6.35	20.39	19.21	8.53	1.22
15-19	3153.8	2764.6	2138.1	125.6	67.82	4.54	12.90	12.66	8.75	0.57
20-24	2416.2	2495.5	2030.5	78.6	84.04	3.15	9.88	11.43	8.30	0.36
25-34	4389.2	4539.5	4253.7	127.3	96.91	2.81	17.95	20.79	17.40	0.58
35-44	3779.3	3293.6	3739.5	107.3	98.95	3.26	15.45	15.09	15.29	0.49
45-54	2663.0	2202.4	2619.3	80.5	98.36	3.65	10.89	10.09	10.71	0.37
55-64	1695.3	1339.2	1625.1	53.4	95.86	3.99	6.93	6.13	6.64	0.24
65+	1373.0	1001.3	1156.7	33.1	84.24	3.31	5.61	4.60	4.73	0.16
Total 10+	24456.3	21830.5	19650.6	872.0	80.35	3.99	100	100	80.35	3.99

*Activity rates have been computed from unrounded data.

Sources : 1. Columns 2 and 3 are taken from Table 4 [11, p. 93].

2. Columns 4 and 5 are taken from Table 14 [11, p. 347].

TABLE II

RURAL-URBAN AGE-SPECIFIC AND AGE-STANDARDISED ACTIVITY RATES :
BANGLADESH MALES, 1974

Age Group	Rural			Urban			Per cent	Standardised Activity Rate	
	A.S. Activity Rate	Per cent Distribution of Total Rural Male Population	A.S. Overall Contribution to CAR	A.S. Activity Rate	Per cent Distribution of Total Urban Population	A.S. Overall Contribution to CAR	Distribution of Total Bangladesh Male Population	Rural	Urban
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)= (2).(8) 100	(10)= (5).(8) 100
10-14	43.68	20.78	9.08	23.25	17.112	3.98	20.39	10.16	5.14
15-19	69.51	12.85	8.93	54.10	13.29	7.19	12.90	8.97	6.98
20-24	85.57	9.44	8.08	75.10	13.61	10.22	9.8	8.45	7.42
25-34	97.26	17.46	16.98	94.57	22.07	20.87	17.95	17.46	16.98
35-44	99.11	15.40	15.26	97.61	15.90	15.52	15.45	15.31	15.08
45-54	98.62	11.02	10.87	95.87	9.81	9.40	10.89	10.74	10.44
55-65	96.56	7.17	6.92	87.28	4.94	4.31	6.93	6.69	6.74
65+	85.44	5.88	5.03	66.04	3.26	2.16	5.61	4.79	3.70
Total 10+	81.15	100	81.15	73.65	100	13.65	100	82.57	72.48

TABLE III

RURAL-URBAN AGE-SPECIFIC AND AGE-STANDARDISED ACTIVITY RATES :
BANGLADESH FEMALES, 1974

Age Group	Rural			Urban			Per cent Distribution of Total Bangladesh Female Population	Standardised Activity Rate	
	A.S. Activity Rate	Per cent Distribution of Total Rural Female Population	A.S. Overall Contribution to CAR	A.S. Activity Rate	Per cent Distribution of Total Urban Female Population	A.S. Overall Contribution to CAR		Rural	Urban
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)=(2).(8)	(9)	(10)
10-14	6.27	18.93	1.19	7.05	22.32	1.57	19.21	1.20	1.35
15-19	4.57	12.41	.57	4.34	15.47	0.67	12.66	.58	.55
20-24	3.00	11.31	.34	4.60	12.77	0.59	11.43	.34	.53
25-34	2.56	20.86	.53	5.58	20.04	1.12	19.97	.51	1.11
35-44	2.98	15.25	.45	6.77	13.32	.90	15.09	.45	1.02
45-54	3.42	10.27	.35	6.97	8.08	.56	10.09	.35	.70
55-64	3.89	6.29	.24	5.43	4.50	.24	6.13	.24	.33
65+	3.30	4.68	.16	3.39	3.50	.13	4.59	.15	.16
Total 10 +	3.83	100	3.83	5.78	100	5.78	100	3.82	5.93

Perspectives of Age-sex Differentials and Rural-urban Characteristics

The relative size and age-composition of the labour force are determined on the supply side by the age-structure of the population and its economic behaviour, and on the demand side by the socio-economic forces at work. Bangladesh has an economically unfavourable age-structure at the base and apex of the age-pyramids of the total population and, consequently, of the economically active population. With median age of 15.9 years only, Bangladesh has a 'younger' population than every major area of the world. This structural imbalance allows only 48.7% of the total population in 1974 in the adult working age-span 15-64, whereas the corresponding figure for Japan was 68.9% in 1970. Following Farooq [2, p. 36], it may be shown that for the 1961 census data, other things being equal, if Japan would have assumed the age-composition of Bangladesh with 50.8% instead of its 60.6% in its male adult working age-bracket 15-59, the Japanese male CAR of 58.5 would decline by about 11%. That hypothetical setting would

give the Bangladesh male CAR in 1961, an excess of 8% over, Japan, as against its actual shortfall of 2.3%. This gives a measure of the economic disadvantage inherent in the age-composition of Bangladesh and shows how structural imbalance lowers the Bangladesh CAR, inspite of its higher age-specific activity rates [4, p. 219]. Since the age-structure of Bangladesh has undergone little change since 1961, the foregoing observation holds good for 1974 as well.

The Bangladesh activity pattern is distinctly marked by higher young and old age participation compared to the developed country pattern represented by Japan and the underdeveloped Asian region pattern (Figure 1). The age-group

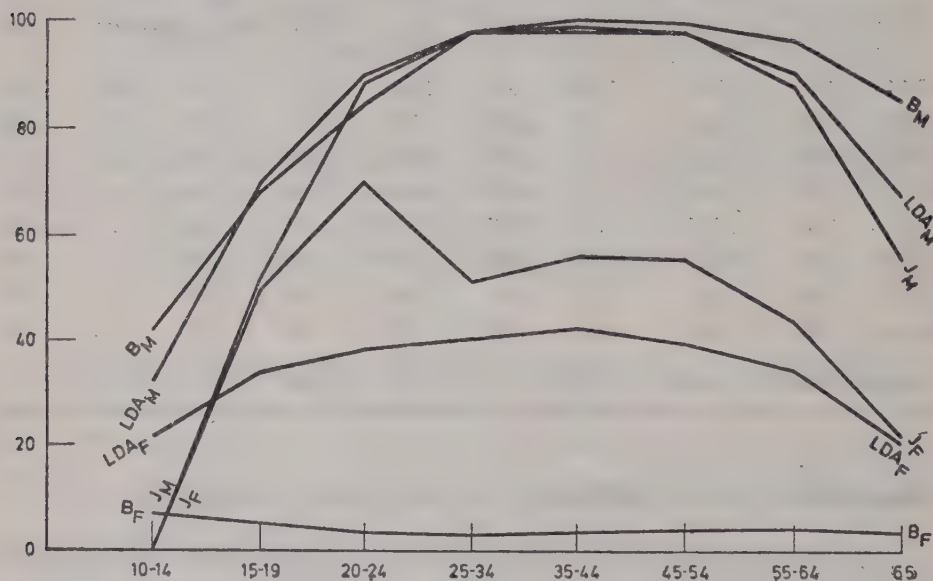


Figure 1

Note : B.J and LDA stand for Bangladesh, Japan and less Developed Asia, while subscripts M and F denote Male and Female respectively.

10-14, with activity rates as high as 41.85 in Bangladesh, 43.68 in rural area and 25.25 in the urban area, makes overall contribution of 8.53, 9.08 and 3.98 respectively to the corresponding CAR's. The female participation pattern clearly shows a young-age bias in that 10-14 is the modal activity age group, sharing about 1/3rd of the female activity burden. The male activity rate at age 65 + is also remarkably high. The combined age-group 10-14 and 65 + make overall contributions of 13.26, 14.11 and 6.14 to the national, rural and urban CAR's respectively. Thus it appears that relatively higher participation at the base and apex of

the age-pyramid of the labour force, to some extent compensates for the structural disadvantage, at least on a quantitative plane. However, it is pertinent to take cognizance of the fact that the higher participation at young age and the superannuation age of 65 +, is directly associated with the low-productivity and unskilled labour of the traditional agrarian practices of Bangladesh. This is corroborated by the relatively higher contribution of these age-groups to the rural CAR as compared to the urban CAR (14.11 as against 6.11). These merely focus attention to the predominantly rural subsistence agricultural economy of Bangladesh, wherein the socio-economic constraints force the young and the old to sell their labour 'for whatever they can get', and employ them 'for whatever they can produce'.

The feet of columns 9 and 10 of Tables II and III give age-standardised rural, urban activity rates, separately for male and females, the standardisation weights being the age-specific shares in the Bangladesh total population 10 years and above, of respective sex category. The rural age-standardised activity rate exceeds the urban rate by 10.09. This provides a summary measure of the extent to which the rural age-specific rates exceed the urban ones, and gives an estimate of the net effect of rural-urban differences in all factors affecting the male labour force, except age-composition of the population. On the other hand, the difference between the unstandardised rural-urban male activity rates is 7.50, far less than that between the standardised rates. This implies that structural difference in the rural-urban age-compositions exert an influence on the relative sizes of the labour force : an influence that is opposite to, and offsets the net effect of other factors that operate regionally. Age-selective migration from rural to urban areas, partially explains the imbalance in the underlying age-compositions.

So far as female activity is concerned, the rural-urban differentials, net of the effect of structural difference in age-compositions, have little perceptible impact, as indicated by the small difference of 2.11 between standardised rural and urban female rates. The difference between the corresponding unstandardised rates is 1.95. The small divergence of 0.06, between this and the preceding difference, implies that the effect of rural-urban difference in age-composition of female population does not tangibly influence the relative sizes of the female labour force in rural and urban areas [7, pp. 40-41].

Female Participation Pattern : An Overview

The behavioural pattern of female labour force participation is governed by the interplay of demographic factors like fertility, age and spacing of children,

set against the socio-cultural milieu of customs and traditions that regulate family composition, nuptiality practices, the role of women in societal and family perspectives, the economic status of the family and superimposed on these, by the available employment opportunities. Analysis of female participation is vitiated by this operation of multiplicity of factors of diverse cause-effect relationships, and this in turn explains a range as wide as 4% to 50% female activity in countries covered by the report on 'Demographic Aspects of Manpower' [25]. Collver and Langlois demonstrate that some countries remain underdeveloped inspite of incidence of high female activity, while still others attain economic productivity with comparatively lower female participation [6,p.368-384]. Youssef [26; 27] concurs with Collver and Langlois in repudiating the proposition that identifies female participation as a primary derivative of economic development alone. According to her analysis, factors like female role in family kinship and social structure, the socio-cultural practice of acknowledging economic obligation to women within the context of kinship institutions and their socio-economic adjuncts, rather than individual characteristics such as marriage and fertility rates possess more discriminatory power in explaining female participation differentials in countries with comparable economic backwardness. Collver and Langlois identify four broad patterns of female participation with respect to difference in socio-cultural setting : one type primarily occurring in the developed countries and the other three in the underdeveloped countries. Of these latter three categories, the 'Muslim Middle East Pattern', with 'early marriage and female seclusion', coupled with lack of opportunities for female employment, closely approximates the Bangladesh pattern of female activity.

Chaudhury in his extensive study [5] based on "The Socio-economic Survey of Working vs. Non-working Women of Dacca City, 1974",⁶ has identified economic pressure⁷ rather than education *per se* as the major catalytic agent in accelerating female participation in urban non-agricultural occupations during the preceding intercensal period, 1961-74. According to his findings, given the same education, a married women originating from economically disadvantageous background as determined by husband's income, occupation or education, is more prone to accept job outside home than a married women who is economi-

⁶"The Working women are defined by the survey as those who are engaged in remunerative jobs in the formal institutions of Dacca City and the non-working women are those who have never worked in life for pay or remuneration outside home, but have the same general level of education as those of working women. The study is mainly concerned with middle class, currently married, and female women" [5].

⁷"Cost of living has almost quadrupled in the years 1972-74, keeping the price index of 1969 as 100" [5].

cally more solvent. There is evidence of a more conciliatory male attitude towards female participation in comparison to the fifties. However, Chaudhury argues for removing sex-discrimination in recruitment and working conditions, and institutionalisation of baby-care as inducements for female participation and concludes that basic change in societal values *vis-a-vis* role and status of women, was a must for major change in female participation in Bangladesh.

IV. OCCUPATIONAL STRUCTURE OF LABOUR FORCE IN BANGLADESH : INTERCENSAL COMPARISON : 1961-74

The conceptual frameworks⁸ used for generating basic data on economic activity in the 1961 and 1974 censuses, are fairly similar [11, p. 33]. Still there are definitional discrepancies that to some extent distort intercensal comparability. The 1961 census, for example, enumerated some of the 'housewives' category as economically active, and this to some extent explains the decline of female labour force by 5.1% per annum over 1961-74. The urban female labour force registers a growth of 7.7% per annum as against the 12.5% per annum increase in the urban female population since 1961. The Bangladesh Census Report, 1974, makes an assessment of the intercensal change as follows : "while the male population for all areas over 10 years increased at the rate of 3.4% per annum, the male civilian labour force (CLF) increased at 2.5%. In both urban and rural areas, the growth rate of the male CLF was below the population growth rate for age-group 10 years and over. For males, the 8.8% annual growth rate of the CLF in the urban area was lower than the population (10 years and over) increase of 9.8%. In rural areas, the CLF increased by 2.1% as against the population (10 years and over) increase of 3%" [11, p. 33]. The excess in rate of growth of population over that of CLF, have only aggravated the burden of economic dependency in Bangladesh over the intercensal period. Table IV brings out the characteristic features of economic category and occupational structure of Bangladesh CLF as in 1961 and 1974. Agriculture employs 77.5% of the male and 69.8% of the female CLF in 1974 as against the 1961 figures of 85% and 91.8%. During the period, male agricultural labour force (ALF) registered an increase of 1.6% per annum as against the rate of decrease of 5.7% of the female ALF.

In 1961 and 1974, 39.2% and 31.6% respectively of the male ALF enjoyed owner-cultivator status, the rate of decrease in this category being 0.1% per annum. The male ALF in owner-cum-sharecropper status increased at the rate of 2.9% since 1961. The category of agricultural labourer accounted for 20.9% of male

⁸The 1974 census adopted 'Labour Force' approach of economic activity rather than the "gainfully employed worker" approach of 1961.

TABLE IV
CLASSIFICATION OF LABOUR FORCE BY ECONOMIC CATEGORY AND MAJOR OCCUPATIONAL STRUCTURE :
BANGLADESH MALES AND FEMALES, 1961-74

Economic/Employment Category	1974				1961				Linear Interpersonal Growth Rate Per Annum (%)	
	Male		Female		Male		Female		Male	Female
	Number*	Per cent	Number	Per cent	Number	Per cent	Number	Per cent		
Civilian Labour Force(CLF)	19.65	100	0.87	100	14.80	100	2.64	100	2.5	-5.1
Owner Cultivator	4.82	31.6	.11	18.3	4.88	39.2	.28	11.4	-0.1	-4.6
Owner Cultivator cum Sharecropper	2.08	13.6	.01	1.8	1.50	12.1	.06	2.3	2.9	-6.2
Sharecropper	.54	3.6	.005	0.8	.49	3.9	.03	1.1	0.8	-6.2
Agricultural Labourer	3.89	25.5	.048	7.9	2.60	20.9	.21	8.8	3.8	-5.9
Unpaid Family Help	3.90	25.7	.43	71.2	29.8	23.3	1.8	76.3	2.4	-5.9
Total Agricultural **Labour Force (AL)	15.23	77.5	0.61	69.8	12.58	85.0	2.42	91.8	1.6	-5.7
Manufacturing Social Services ***	0.91	4.6	.04	4.2	.62	4.2	.12	4.6	3.5	5.4
Other NAL Including those Looking for Work	1.63	8.3	.04	5.1	.90	6.1	.02	0.7	—	—
Total Non-agricultural Labour Force (NAL)	4.42	22.5	0.26	30.2	2.22	15.0	.22	8.2	7.5	1.6

*All the numbers are in millions

** Agriculture includes forestry, fishing and hunting

***Covers community, social and personal services.

Source : Table 41, 43, 44 in [11, pp. 40-44].

ALF on 1961 and 25.5% in 1974. The high rate of increase, 3.8% per annum, in this category has a direct bearing on the increasing rate of landlessness. The category, of "unpaid family help" comprised 23.9% of the male ALF in 1961 as against 25.7% in 1974. The rate of increase of 2.4% per annum, registered in this category, may be treated as an index of the increasing rate of the gruelling constraints of subsistence economy that compel increased labour force participation in the young or old age brackets. Of the total female ALF, 76.3% in 1961 and 71.2% in 1972 belong to this category of "unpaid family help", and this definitely bears a reflection on the low quality of female labour force in Bangladesh.

The non-agricultural labour force (NAL)⁹ accounted for 15% and 22.5% of the total male CLF in 1961 and 1974 respectively, the corresponding rate of increase being 7.5% per annum. The manufacturing sector accounted for 4.6% of the total male CLF in 1974, as against the 1961 share of 4.2%, the rate of increase being 3.5% per annum. The social services sector employed 9.6% of the male CLF in 1974, as against 4.7% in 1961, the corresponding female figures being 20.9% and 2.9% respectively. Here the intercensal growth rate for male CLF is 12.9% per annum, whereas with the corresponding figure of 10%, the female labour force registers its highest rate of increase in this sector. The foregoing observations lead us to conclude that no significant restructuring of the labour force took place during the intercensal period 1961-74.

Economically inactive population aged 10 years and above comprised 36% in 1974 and 28.7% in 1961; this increase is partially attributable to the increase in the proportion of housewives to 28.3% in 1974 from 21.8% in 1961. Students, with an annual increase of 14.6% since 1961, constituted more than half of the economically inactive population in 1974 [11, p. 39].

V. LENGTH OF ECONOMICALLY ACTIVE LIFE : MORTALITY AND BANGLADESH LABOUR FORCE DYNAMICS, 1974: SOME RELEVANT COMPARISONS

Working Life Tables

Abridged Tables of Economically Active Life for females and males (Tables V and VI), are based on Abridged life Table [10, p. 7] which in

⁹A group of workers, engaged in agriculture, fishing and trapping occupation was misclassified into NAL in 1961 [11, p. 39].

their turn, are based on Model (complete) Life Tables¹⁰ of Bangladesh males and females, 1974, [13, pp. 89-92]. In constructing the working life tables and the tables that follow, the methodology outlined in [7, pp. 19-34] have been followed.

Since from age 25 onwards, data on economically active population are given in decennial age-groups, these had to be disaggregated into quinquennial ones by using the Sprague¹¹ obsculatory interpolation multipliers given in Table C [24, p. 876]. For this purpose, the following procedure was adopted:

- i) Though total, as against economically active, population figures for quinquennial intervals were readily available, these were merged into decennial intervals, and then disaggregated into quinquennial ones, in order to introduce the same pattern of graduation in data on age-specific total population and economically active population.
- ii) The Sprague interpolation formula uses five equi-spaced tabulated values (2 above and 2 below the interval to be disaggregated). Therefore, in order to interpolate to halves in the interval 25-34, age-specific population total of the interval 5-14 was used, and the economically active population for age-group 10-14 was treated as of the interval 5-14. Further to interpolate to halves in the interval 55-64, the open age-group 65+ was treated as 65-74 and then the dummy interval 75-84 was used with zero population and zero economically active population.

Using the quinquennial figures thus obtained, the age-specific activity rates were computed afresh. The activity rates for the age-groups¹² 65-69, 70-74 and 75+ for the male population were then estimated by graphic extrapolation. These age-specific activity rates provided the essential link in the transition from the life table to the table of economically active life.

¹⁰The Model Life Tables are based on mortality data collected through the Bangladesh Retrospective Survey on Fertility and Mortality, 1974. The estimated child mortality and adult mortality were linked together by using Brass's two parameter model life table system. The Model life Table was then generated by using the relation. $Y(x) = \alpha + \beta Y_s(x)$

Where $Y(x)$ is the logit of the life table survivors at age x in the model to be constructed and $Y_s(x)$ is the corresponding logit in a "Standard" life table. In case of Bangladesh, Brass's "General Standard" was used [13, p. 168].

¹¹The Sprague Interpolation Multipliers are based on two overlapping 4th degree polynomials, one fitted to groups G_1 to G_4 and the other to groups G_2 to G_5 , with the combined equation forced to have the tangent of the first curve at the start of group G_3 and the tangent of the second curve at the end of G_3 [24, pp. 700-701].

¹²The economically active population for age-group 65+, obtained by using these estimated age-specific activity rates, falls short of the corresponding actual figure by about 30,000, an error of 2% only.

TABLE V

ABRIDGED TABLE OF ECONOMICALLY ACTIVE LIFE : BANGLADESH FEMALES, 1974

Age Interval (exact Ages x to x + 4)	Specific Activity Rate		Survivors at Age x of 10000 Born Alive		Stationary Popu- lation in Age Interval		Cumulated Stationary Population at Age x-∞		Expectation of Life at Age x			Per cent Life Time Inactive	Average Remaining Active Years per Active Survivor of Age x
	In Age Inter- val	At Begi- nning of Age Interval	Total (lx)	Econo- mically Active	Total 5Lx	Econo- mically Active	Total	Econo- mically Active	Total Years	Econo- mically Active Years	Inactive Years		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
0-4	0	0	10000	0	—	—	—	14430	46.62	1.44	45.18	96.91	—
5-9	0	0	7840	0	38788	0	424155	14430	54.10	1.84	52.26	96.60	—
10-14	6.35	3.18	7675	244	38068	2417	385367	14430	50.21	1.88	48.33	96.25	33.70
15-19	4.54	5.45	7552	411	37250	1693	347299	12013	45.99	1.59	44.40	96.54	29.23
20-24	3.15	3.85	7348	283	36078	1136	310049	10320	42.20	1.40	40.80	96.68	36.47
25-29	2.98	3.07	7083	217	34760	1037	273971	9184	38.68	1.30	37.38	96.64	42.32
30-34	2.61	2.80	6821	191	33440	874	239211	8147	35.07	1.19	33.88	96.61	42.65
35-39	3.30	2.96	6555	194	32070	1058	205771	7273	31.39	1.11	30.28	96.46	37.49
40-44	3.21	3.25	6273	204	30585	981	173701	6215	27.69	0.99	26.70	96.42	30.47
45-49	3.56	3.87	5961	202	28850	1028	143116	5234	24.01	0.88	23.13	96.33	25.91
50-54	3.77	3.67	5579	204	26710	1006	114266	4206	20.48	0.75	19.73	96.34	20.62
55-59	4.02	3.89	5105	199	24083	967	87556	3200	17.15	0.63	16.52	96.33	16.08
60-64	3.95	3.98	4528	180	20830	822	63473	2233	14.02	0.49	13.53	96.50	12.41
65+	3.31	3.63	3804	138	42643	1411	42643	1411	11.21	0.37	10.84	96.70	10.22

Source : Based on Abridged Life Table, 1974 [10, p.7] constructed from Model Life Table for Bangladesh Females [13, p.91].

TABLE VI
ABRIDGED TABLE OF ECONOMICALLY ACTIVE LIFE : BANGLADESH MALES, 1974

Age Inter- val (exact age x to $x + 4$)	Specific Activity Rate		Survivors at Age x of 10000 Born Alive		Stationary Popula- tion in Age Interval		Cumulated Stationary Population at Age $x - \infty$		Expectation of Life at Age x		
	In Age Interval	At Beginning of Age Interval	Total (l_x)	Economi- cally Active	Total ($5L_x$)	Economi- cally Active	Total	Economi- cally Active	Total Years	Econo- mically Active Years	Inactive Years
1	2	3	4	5	6	7	8	9	10	11	12
0-4	0	0	10000	0		0		327377	45.80	32.74	13.06
5-9	0	0	7678	0	37988	0	417672	327377	54.48	42.64	11.76
10-14	41.85	20.93	7517	1573	37285	15605	379684	327377	50.51	43.55	6.96
15-19	67.82	54.84	7397	4057	36485	24744	342399	311772	46.29	42.15	4.14
20-24	84.04	75.93	7197	5465	25338	29697	305914	287028	42.51	39.88	2.63
25-29	96.70	90.37	6938	6270	34030	32907	270576	257331	39.00	37.09	1.91
30-34	97.13	96.92	6674	6468	32720	31782	236546	224424	35.44	33.63	1.81
35-39	99.38	98.26	6414	6302	31380	31187	203826	192642	31.78	30.03	1.75
40-44	98.63	99.01	6138	6077	29923	29513	192446	161455	28.09	26.30	1.79
45-49	98.45	98.54	5831	5746	28238	27800	142523	131942	24.44	22.63	1.81
50-54	98.02	98.24	5464	5368	26188	25670	114285	104142	20.92	19.06	1.86
55-59	97.83	97.93	5011	4907	23678	23165	88097	78472	17.58	15.66	1.92
60-64	93.55	95.69	4460	4268	20573	19246	64419	55307	14.44	12.40	2.04
65-69	88.66	91.11	3769	3434	16838	14929	43846	36061	11.63	9.57	2.06
70-74	82.00	85.33	2966	2531	12517	10264	27008	21132	9.11	7.17	1.99
75 +	75.00	78.50	2041	1602	14491	10868	14491	10868	7.10	5.32	1.78

(Continued)

TABLE VI (Continued)

Per cent Life Time Inactive	Average Remaining Years	Net Increase(+) or Decrease(-)	Components of Annual Change in Number of Economically Active Persons during Age Interval					
			Death of Active Persons		Net Entries into Economic Activity		Net Retirements into Inactive Status	
			Number (adjusted)*	Rate per 1000 Active	Number (adjusted)	Rate per 1000 Inactive	Number (adjusted)	Rate per 1000 Active
13	14	15	16	(17)=(16) ÷ (7)	18	19	20	(21)=(20) ÷ (7)
28.52		1543			1573	41.41		
21.62	49.26	2484	50	3.20	2534	116.88		
13.78	45.02	1408	136	5.50	1544	131.50		
8.94	41.20	805	219	7.37	1024	181.56		
6.19	37.65	198	264	8.02	462	411.40		
4.90	34.04	-166	255	8.02	89	94.88		
5.11	30.31	-225	266	8.52	41	212.44		
5.51	26.57	-331	303	10.27				
6.37	22.96	-378	361	12.99			28	0.95
7.41	19.40	-461	445	17.34			17	0.61
8.89	15.99	-639	534	23.05			16	0.62
10.92	12.96	-834	646	33.57			105	4.53
14.13	10.50	-903	709	47.49			188	9.77
17.71	8.34	-929	758	73.85			194	12.99
21.84	6.78	-1602	646	59.44			171	16.66
25.07							956	87.96

*For 'adjustment', see [7, pp. 29-31].

Source : Based on abridged life table [10, p. 7] constructed from Model Life Table for Bangladesh Males [13, p. 89].

Length of Economically Active Life : Bangladesh, 1974

Abridged tables of economically active life (Table V for females and Table VI for males) provide us with two alternative measures of expected length of working life. The first, the expectation of active life (Col. 11), gives the average number of economically active years for all survivors of the cohort at the given age. From Table VI, it appears that the economically active life expectancy pattern of Bangladesh males closely follows the pattern of total life expectancy. In fact, during the best working age-bracket 20-44, the Bangladesh males are expected to spend less than 8% of their life-span in inactive status; the corresponding inactivity share of the Indian males, 1971, is more than 10% [17]. The high degree of male participation in Bangladesh is all the more evidenced by the fact that even at age 75, the expected inactivity share is just over a quarter of the expected life span. In contrast, the female working life expectancy portrays a dismal picture of consistently inactive pattern. The Bangladesh females appear to spend a each age more than 96% of their expected life-span in non-economic pursuits. The corresponding non-activity share of 80%—90% for the Indian females, puts them at a higher plans of economic activity.

The second measure of length of economically active life for males, is provided by the average remaining years (Col. 14) of active life per economically active person among the survivors of the cohort at each age. The validity of this measure rests on the fulfilment of certain conditions,¹³ which in different degrees of departure, fail to hold in case of Bangladesh, as in case of other developing countries. It is nonetheless worthwhile to compare the average remaining active years per active survivor at each age with the corresponding total life expectancy, and one finds a small average divergence (Col. 10—Col. 14) of nearly one unit only. This small divergence closely follows the expected inactive years (Col. 12), at least for ages from 25 to 55. Thus it appears that the two alternative measures of the length of economically active life for Bangladesh males, are in close agreement.

Because of the "patently erratic pattern" of female participation, the first two conditions given in foot note 19 fail to hold in case of females. Consequently

¹³The conditions are

- i) that all persons who enter the labour force at any time in their lives do so prior to the age at which the activity rate reaches its maximum, and no survivors retire into inactive status prior to that age;
- ii) that the ages at which individuals retire are independent of the ages at which they enter the labour force;
- iii) the rate of mortality at each age is the same for economically active and inactive persons [7, p. 26].

the average remaining years as a measure of length of female working life loses much of its relevance and it is hazardous to adduce any meaningful interpretation to it.

Trend in Working Life Expectancy : 1962-74

Trends in economically active life expectancy is of vital importance from economic-demographic policy perspectives. Bean, in his pioneering study [3], obtained 'provisional' estimates of length of male working life in Bangladesh (then East Pakistan) for 1962/63, by using life table generated by the PGE¹⁴ mortality data and 1961 activity rates.

Bean expected a decline in the length of working life in Bangladesh (Pakistan) over time. Working-life expectancy level in 1974 fell much below that of 1962/63, by wide margins at least upto age 20, as is evident from comparisons of columns 4 and 5 of Table VII. But how much of this wide divergence is attributable to 'rising age of entry into labour force and increased rates of retirement in the older ages', as anticipated by Bean, is open to question. Part of the apparent divergence is, of course, ascribable to under-estimated young-age mortality level of 1962/63, as it appears from the over-estimated life-expectancy till age 20 (Column 2), compared to the 1974 level (Column 3). Part of the residual divergence is purely methodological. Bean operated the modal activity rate on the stationary life table population in order to get stationary active population [7, pp. 130-31] for ages below the modal activity age-group. Column (6) presents the 1974 working life expectancy level as estimated by the procedure adopted by Bean. Contrasting this with the level obtained by the present study (Column 5), we get a partial measure of the extent of over-estimation involved in young-age work-life expectancy in 1962/63, as given by Bean. From age 40 onwards, the life-expectancies of the two periods are in close agreement and Bean's work-life expectancies are free of methodological over-estimation. We may thus venture to state that the slight decline in the 1974 level of working-life expectancy compared to the 1962/63 level, is 'real' for the later years.

But superimposed on all these, is the unpredictable nature of distortion that might have been introduced by the operation of multiplicity of errors involved in the basic data underlying these comparisons. Hence it is obviously hazardous to make any meaningful observation about the trend in length of working-life in Bangladesh over time or to attempt a projection into the future.

¹⁴Population Growth Experiment of Pakistan, 1962-63,

TABLE VII
WORKING LIFE EXPECTANCY OF BANGLADESH MALES,
1962/63 (BEAN) AND 1974

Age	Life Expectancy		Working Life Expectancy		
	1962/63 (Bean)	1974*	1962/63 (Bean)	1974	
				This Study**	Following Bean's Procedure
1	2	3	4	5	6
10	54.82	50.51	53.25	43.55	48.19
15	50.23	46.29	48.95	42.15	44.58
20	45.63	42.51	44.36	39.88	40.78
30	36.67	35.44	35.39	33.63	33.74
40	28.17	28.09	26.89	26.30	26.30
50	20.66	20.92	19.27	19.06	19.06
60	13.92	14.44	12.76	12.40	12.40
70	8.87	9.11	8.16	7.12	7.12

*Col. 10, Table VI. **Col. 11, Table VI.

Source : Bean [3].

Length of Working Life : An International Comparison

Table VIII gives the expected lengths of working life in Ghana (1960), Nigeria (1965), India (1971) and Bangladesh (1974), at selected ages. Differences in conceptual frameworks used for generating basic data on economic activity or mortality rates, might have obscured the true active life expectancies in the countries concerned. Again the data refer to different points of time. Nevertheless a comparative study of the patterns of working life expectancies in the above developing countries, is still rewarding. It appears from the table that Bangladeshi males have consistently higher working life expectancy compared to the Ghanaian and Nigerian males. The Indian males fare better than their Bangladeshi counterparts till age 25, but worse in the later years. In contrast, the Bangladesh females have the lowest working life expectancy. In Table VIII, the Indian females at age 50 have the lowest working life expectancy, 3.2, and this is twice the highest expectancy of the Bangladesh females at age 15. The countries under consideration differ only in degrees of under-development but the strikingly high differential in female working-life expectancy, once again stresses the point that socio-cultural factors, rather than economic determinants alone, regulate female participation in economic activity.

Gross Years of Economically Active Life

With crude death rate of 20 per 1000 [13, p. 99], Bangladesh is exposed to moderately high force of mortality. In order to estimate the extent of the toll that

TABLE VIII

**EXPECTATION OF ECONOMICALLY ACTIVE LIFE AT SELECTED AGES
IN SELECTED COUNTRIES**

Age	GHANA 1960		NIGERIA 1965		INDIA 1971		BANGLADESH 1974	
	Males	Females	Males	Females	Males	Females	Males	Females
1	2	3	4	5	6	7	8	9
15	38.1	41.4	40.5	39.8	43.1	9.0	42.2	1.6
20	34.6	38.1	36.7	36.5	40.9	8.4	39.9	1.4
25	31.5	34.9	32.8	33.0	37.6	7.7	37.1	1.3
30	28.4	31.5	28.9	29.4	33.6	6.9	33.6	1.2
40	21.6	24.9	21.2	22.2	25.5	5.1	26.3	0.9
50	15.1	18.4	14.7	15.6	17.7	3.2	19.1	0.6

Source : Columns 8 and 9 are taken from column 11 of Tables VI and V respectively :
the rest are taken from [17].

mortality takes of the economically active life, it is quite relevant to compute mortality-free or gross years of active life ; these give the average number of active years per person had there been no loss due to premature mortality. Two measures of gross years of economically active life, assuming the female open-age interval 65+ to have 5 or 15 years, and the male open interval 75+ to have 5 years, are presented in Table IX, which also gives the corresponding Indian measures.

The gross years of active life for Bangladesh males exceed that of the Indian males by about 5 units in both the age-brackets considered. This may be largely due to the higher¹⁵ young and old age participation of the Bangladeshi males. But the superiority of Bangladesh in terms of gross years of active life is neutralised by the relatively heavier toll that mortality takes of the male active life in Bangladesh. Whereas mortality claims 17.99% and 28.55% of gross years of active life of Bangladeshi males in the age-brackets 10-70 and 10-80 respectively, the corresponding Indian figures are 10.6% and 24.2%. The gross years of active life for Bangladesh females is only about 1/4th that of the Indian females, but a heavier share of the toll of mortality is allotted to the Bangladesh females as well.

¹⁵In fact in the age-group 10-14, the Bangladeshi male participation rate is 41.85 as against the Indian rate of 6.6 and the Bangladesh rate in the open age interval 65 + is 84.24 as against the Indian rate of 73.8 in the open interval 60 +,

TABLE IX

GROSS YEARS OF ACTIVE LIFE : BANGLADESH (1974) INDIA (1971)

		Bangladesh, 1974		India, 1971*	
		Males	Females	Males	Females
Gross Years of	10-70 years	53.10	2.24	48.1	10.0
Active Life during	10-80 years	60.95	2.57	56.7	11.1
Expectation of					
Active Life at Age 10		43.55	1.88	43.0	8.99
Loss due to	10-70 years	9.55	0.36	5.1	1.01
Mortality during	10-80 years	17.40	0.69	13.7	2.09
Loss as a	10-70 years	17.99	16.07	10.6	10.1
Percentage of					
Gross Years	10-80 years	28.55	26.85	24.2	18.9

*Krishnan [17].

Labour Force Dynamics : Components of Annual Change in Male Labour Force of Bangladesh, 1974

The economically active population, like the total population, is subject to a continuous process of replacement: depletion in labour force occurs due to death and retirement¹⁶ whereas new entrants replenish it. Death and retirement components of change in economically active population are the resultant of the structural ageing of the population determined by the forces¹⁷ of mortality and fertility; and the third component, new entry, is determined by the behavioural pattern of economic activity.

In Table VI, the columns through 16 and 21 present a vivid picture of how the components of change in economically active population operate through the age-groups. Since this table relates to hypothetical, stationary population of life-table cohort, the labour force necessarily becomes stationary so that the net entries into economic activity are exactly balanced by the net withdrawals due to death and retirement. Hence it loses much of the relevance for real life situation. Nevertheless the rates of entry¹⁸ into active status and rates of withdrawal into the inactive status, provided the vital operational link for studying the dynamics of actual male labour force of Bangladesh as presented in Table X.

¹⁶The composite term 'retirement' stands for all the causes of withdrawal from the labour force except death.

¹⁷The effect of migration is ignored.

¹⁸The rates are computed on the assumption of only one entry and one withdrawal per worker, i.e. there is no entries followed by withdrawal or subsequent re-entry. The assumption is tenable in case of males, but would not be valid for the females [8, p. 57]. Hence the study is confined to male labour force only.

TABLE X
ANNUAL LOSSES FROM LABOUR FORCE BY DEATH AND RETIREMENT AND GAINS BY ENTRIES
FROM THE INACTIVE POPULATION OF BANGLADESH, 1974

Age Group	Population (in '000)	Labour Force (in '000)	Inactive Population (in '000)	Annual Losses from Labour Force by Death		Annual Entries into Labour Force		Annual Retirements from Labour Force	
				Rate per 1000 of Labour Force	Estimated Number (in '000)	Rate	Number	Rate per 1000 of Labour Force	Estimated Number (in '000)
1	2	3	4	5	6	7	8	9	10
5-9	6599.6		6599.6			41.41	273.289		
10-14	4986.5	2087.1	2899.4	3.20	6.679	116.88	338.882		
15-19	3153.8	2138.8	1015.0	5.50	11.763	131.50	133.473		
20-24	2416.2	2030.5	385.7	7.37	14.965	181.56	70.028		
25-29	2244.0	2170.0	74.0	8.02	17.403	411.40	30.44		
30-34	2145.2	2083.7	61.5	8.02	16.711	94.88	5.829		
35-39	1992.6	1980.3	12.3	8.52	16.872	212.44	2.613		
40-44	1786.7	1759.1	27.6	10.27	18.066				
45-49	1475.2	1455.0	20.2	12.99	18.900			0.95	1.671
50-54	1187.8	1164.3	23.5	17.34	20.189			0.61	0.888
55-59	914.2	894.4	19.8	23.05	20.616			0.62	0.722
60-64	781.1	730.7	50.4	33.57	24.530			4.53	4.052
65-69	429.8	381.0	48.8	47.49	18.094			9.77	7.139
70-74	488.6	400.6	88.0	73.85	29.584			12.99	4.949
75 +	454.6	341.0	113.6	59.44	20.269			16.66	6.674
Total 5+	31055.9	19616.5	11439.4		254.641		854.558	87.96	29.994
Total 10+	24456.3	19616.5	4839.8		254.641		581.269		56.089

Sources : i) From age 25 onwards decennial figures of data on population and labour force have been disaggregated into quinquennial ones by Sprague interpolation formula. For ages 65 onwards, the labour force figures are obtained by operating the graphically extrapolated activity rates on population figures given in [11, p. 73].

ii) Columns (5), (7), (9) are read respectively from columns (17), (19), (21) of Table VI.

It appears from Table X that of the estimated total annual entries into the labour force, 88.2% occur in the age-bracket below 20 and that the rate of entries consistently increases upto the age-group 25—29, which has the highest rate of entry of 411.40 per 1000 inactive persons in that age-group. Over the age-groups 25-29 to 55-59, the rate of death per 1000 labour force is almost tripled, but the age-specific depletion in labour force due to death is more or less homogeneous varying within the range 16711 to 20616. Of the total estimated annual withdrawal of 310730 from the labour force, the process of retirement accounts for 18% only, the rest being claimed by death. In fact, the rate of loss due to death exceeds that due to retirement till the fag end of economic activity except for age-group 75+ when rate of retirement rises sharply as well and claims 53.5% of the estimated total annual retirement. Death takes 55.6% of its annual estimated toll below age 55 whereas 94.15% of the total annual retirement occurs at age 55 and above. As against the estimated total annual withdrawal of 310730 persons, there are 854558 new entries, so that the net annual additions to the male labour force is estimated as 543828 as of 1974. The sums at the foot of Table X permit the computation of the statistics of labour force dynamics in Bangladesh, as presented in Table XI.

The variation between the rate of entries (43.56) into and the rate of withdrawal (15.84) from the labour force gives a measure of the annual rate of change in labour force size. Thus the rate of replacement or the rate of natural increase, within the context of the prevailing age-structure, activity pattern and life-table mortality experience, is estimated as 27.72 per annum per 1000 of male labour force in Bangladesh, 1974. It appears from column 8 of Table X that 273289 persons belonging to age 5-9 register their entry into the labour force by age 10, and if they are excluded, the rate of natural increase comes down to 13.8 (half that for 5+). This in essence indicates the preponderance of the young-age influx into the labour force, drastically enhancing the rate of natural increase.

The labour force replacement ratio, defined as the annual number of entries into the labour force per 100 depletion from the labour force due to death and retirement, works out to be 275 (for age 5+) for Bangladesh males. This is an index of the demographic pressure on the job-market in the sense that for every 100 jobs vacated by withdrawal from the labour force, a total of 275 new entrants, and a net addition of 175 job-seekers, demand employment opportunities.

TABLE XI
ANNUAL CRUDE RATE PER 1000 OF THE LABOUR FORCE

	10 Years and Above	5 Years and Above
Entries	29.63	43.56
Retirements	2.86	2.86
Loss by death	12.98	12.98

VI. SUMMARY AND CONCLUSIONS

The distinctive feature of the behavioural pattern of economic activity in Bangladesh, 1974, is its predominantly rural, agrarian character marked by overwhelmingly high male participation and abnormally low female participation. The age-sex-rural-urban differentials are prominent in both quantity and quality aspects of labour force. Rural-urban differentiation in effect dichotomises the economically active population into agricultural and non-agricultural labour force with their characteristic occupational structures. Intercensal comparisons reveal that no significant rural-urban redistribution of the labour force or its re-structuring among fields of economic activity took place during the period 1961-74.

The expected length of the economically active life for male in Bangladesh though low in absolute terms, yet compares favourably with the pattern prevalent in selected developing countries including India. But mortality appears to take a heavier toll of working life in Bangladesh than in India. Regarding the relationship between mortality and male labour force dynamics in Bangladesh, it appears that death accounts for 82% of the annual withdrawal from the labour force, the rest of it being accounted for by the composite process of retirement. Death claims 55.6% of its annual toll below age 55, whereas 94.15% of the total annual retirements occur at age 55 and above. The excess of rate of entries into, over the rate of withdrawals from the labour force, calculated as 27.7 per 1000 of the labour force, gives the rate of natural increase for the male labour force. Finally, the male labour force replacement ratio for Bangladesh implies that for every 100 withdrawals from the labour force, 275 new entrants into, or 175 net additions to the labour force take place. This at once touches the threshold of the problem of planned investment for absorbing the net additions to the labour force productively, just to maintain *status quo* in employment level, if not to improve upon it. But to put the problem in its proper perspectives, one must take into account the large-scale un- and underemployment that is endemic in particular in rural Bangladesh, except during seasonal peaks of agricultural activity. A FAO report estimated the size of un- and underemployment in agriculture to be 35.6% in 1974 [9], so that the un- and underemployment figure in agriculture alone stood at 5.64 million. Assuming the same percentage in non-agricultural labour force (obviously an unrealistic assumption, but the census estimate of 0.5 million besides being an under-estimate, does not give any measure of underemployment), we have 1.67 million ¹⁹ in this sector, so that the backlog of un- and under-

¹⁹Robinson [23] puts the figure at 1.68 million.

employment in Bangladesh stood at 7.31 million in 1974. We have reasons to believe that of net annual additions²⁰ to labour force, about half a million remain either unemployed or seriously under-employed, so that the current backlog of un-and-underemployment stands at around 9.5 million. Given the realities of the near-subsistence quasi-static agrarian economy, Bangladesh is faced with the stupendous task of providing productive employment to this massive backlog of unemployment and underemployment and catering means of meaningful subsistence to an impoverished people, more than 70% of whom live below any acceptable poverty line [21].

²⁰Addition to female labour force is not estimated, but in any case, its quantitative impact is insignificant.

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Insurance for Small Farmers to Encourage Innovation

by

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Government-sponsored innovation insurance could be used as a policy to offset possible undesirable income distribution effects associated with a fertilizer-intensive high yielding-variety strategy for agricultural development. Unequal income distributions are intensified if wealthy farmers accept profitable innovations while poor farmers do not, and such adoption patterns have been observed in some areas around the world. It has been suggested that one cause of this is the unwillingness and inability of poorer farmers to bear the risks associated with innovation. Crop insurance plans have been suggested as a measure to offset these risks. The mechanics of such a plan along with a method for basing insurance premiums on a limited amount of experimental data are discussed in this paper.

I. INTRODUCTION

In a recent article Johnston and Cownie indicate that "the drastic change in production possibilities resulting from the new seed-fertilizer combination has...encouraged sharply divergent views concerning the choice between an agricultural development strategy that emphasizes increasing productivity within the framework of the existing small-scale agriculture, and an approach that would give special encouragement to large scale units and an early shift from animal draft power to tractor mechanization"[4]. In most of Asia, the enormous size of the labour force which would have to be shifted to the non-agricultural sector if replaced by mechanization and the resulting social problems provide a persuasive argument for a labour-intensive strategy of farm production.¹ The highly fertilizer-responsive varieties (commonly called high-yielding varieties and hereafter referred to as HYV) appear to be precisely the kind of technological innovation desirable in a development strategy that emphasizes labour inten-

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¹The argument is put most forcefully by Kusum Nair [6].

sive production rather than increasing scale. While the fertilizer and seed components of the HYV technology are neutral with respect to scale, there appear to be certain economies associated with financing or irrigation. Objections to the new technology have been raised on the grounds that it will only be accepted by large scale, wealthy farmers, thereby exacerbating the existing income distribution problems, and what is worse, permitting the large scale producers to invest in labour displacing machinery.

Several things may contribute to the observed reluctance or inability of operators of small farms to accept the same HYV which are clearly profitable on large farms.² Among those, the risk involved in using an unknown technology may be a primary factor. A policy instrument which alleviates the risks to individual producers may prove useful in encouraging small farmers to adopt innovations, offsetting possible advantages for large farmers. This would be beneficial to society since economic innovations are by definition more productive than traditional practices. Innovation insurance is suggested here as such a policy instrument.

As already indicated, a precondition for a workable programme of innovation insurance is an innovation like HYV which is clearly more productive than traditional varieties on the average,³ but which carries (objectively or subjectively) a higher risk.⁴ By knowing the objective probability distribution of possible outcomes of the innovation the insurance plan could protect unsuccessful innovators. Educational efforts to decrease the failure rate and thus reduce programme premiums in subsequent years could be made a part of the insurance programme.

Crop insurance plans are common in developed countries and are not unknown in low income countries,⁵ and the idea of providing some kind of insurance for innovators has been suggested elsewhere. However, the premiums for innovation insurance cannot be calculated on the usual historical actuarial basis because of lack of data. When the innovation involves the use of different quantities of an input like fertilizer as it does in the present case, the functional relationship between input and production must be considered as well as the variability in that functional relationship.

²This reluctance has been documented in almost every study of innovations, and for the HYV in [8].

³The rate at which HYV has spread in India, Pakistan and the Philippines shows that many producers find them very attractive. This success is documented in [2].

⁴The distinction between subjective and objective risk and their impact on small farmers is discussed in [10].

⁵For a discussion of crop insurance experiments, see [7 ; 9].

For illustrative purposes we have estimated the probability distribution function measuring the variability in fertilizer response from experimental data on the response of HYV rice to nitrogen fertilizer in India. We recognize that in actual practice the basis for such a probability distribution function would have to be responsive to fertilizer under conditions on farmers' fields within a relatively homogeneous region, say a district in India. This might require a programme of wide-scale local testing, but such a programme might also be necessary as a guide in the formulation of extension recommendations for a package of practices for producing the HYV under conditions existing in each district.

To provide protection against weather, insect, and disease risks, as distinct from risks due to lack of knowledge about the innovation, each district programme could reinsure with a state or national programme. The exact organization would have to depend on the particular country.

The plan would encourage small farmers to increase their production and income by adopting a "package" innovation consisting of a high yielding variety, the recommended level of fertilizer, and other recommended practices. The plan attempts to overcome the risk-avoiding tendencies of small farmers by guaranteeing them some minimum income⁶ even if their crop fails completely (zero yield). It further encourages them to strive to attain good results with the HYV through an incentive feature which provides increased income for increased yields.

II. MECHANICS OF THE PLAN

Figure 1 illustrates our hypothesized view of the typical subsistence farmer's subjective idea of the probability distribution of yields with the traditionally used local variety and with the "package" of HYV, fertilizer and other practices. The new technology is seen as having a higher probability of achieving the high yield "C", but the probability of a yield below the level "A" is also greater with the innovation than with the old practice. If the producer tries to get the highest minimum, he acts rationally in not accepting the innovation.

Figure 2 is a diagrammatic description of the proposed insurance system. Under the insurance plan a guaranteed level of gross income, \bar{Y} , would be fixed in advance of the planting season, and would probably bear some relation to the

⁶A guaranteed quantity of grain might be preferred to an income guarantee under subsistence conditions. However, it would involve the government in transporting grain and increase the administrative cost of the plan by an unknown amount. The present proposal is written in terms of income so as to facilitate the calculation of programme costs.

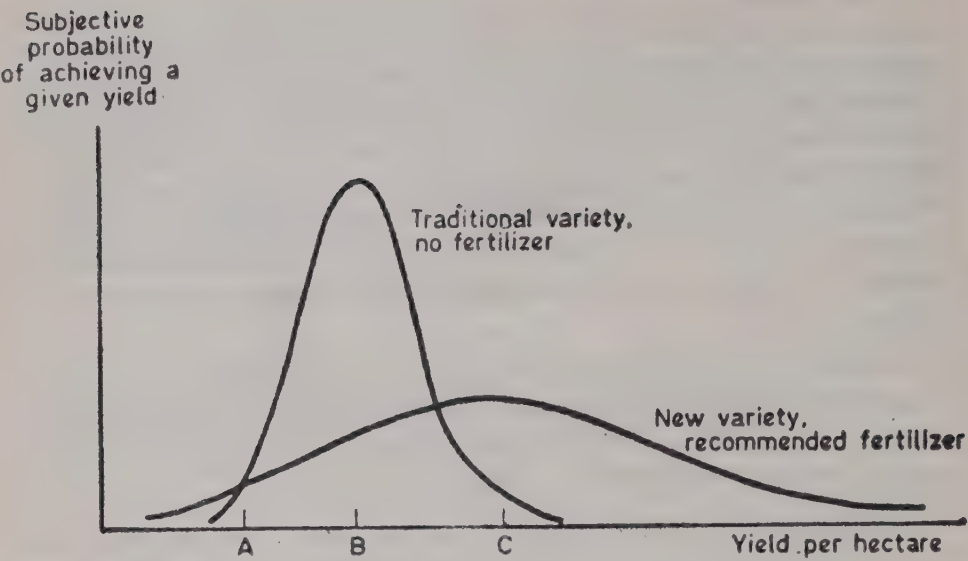


Figure 1

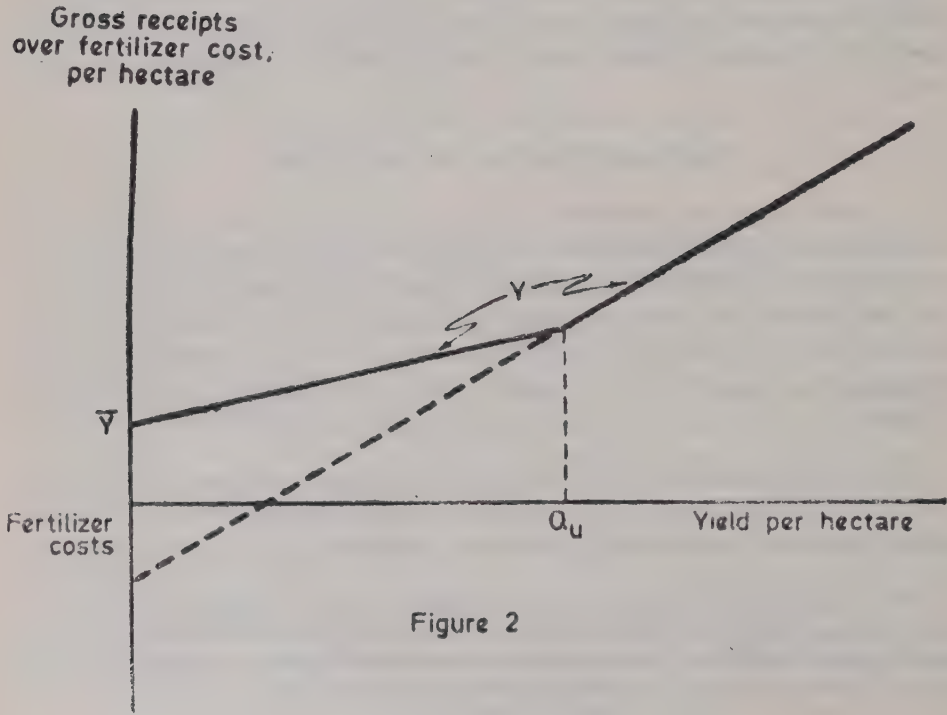


Figure 2

"normal" income obtained with traditional practices. To qualify for the insurance a farmer would agree to plant the new variety following specific recommendations and would agree to verification of his yields. Any producers unfortunate enough to sustain a complete crop failure would receive the guaranteed minimum, \bar{Y} , plus reimbursement for expenditure on fertilizer. Those with positive yields below some upper limit, Q_u , would receive a payment designed so that their gross receipts (insurance payment plus receipts from the HYV) would increase as their yields increased. Those whose yields and receipts⁷ exceeded the established upper limit would receive no payment.

III. PAYMENTS TO PARTICIPANTS

The per hectare payment made to participants whose yield is below Q_u is calculated as :

$$C = \bar{Y} + kP_h Q_h - Y_h \quad \dots(1)$$

The incentive factor, " kP_h " in equation (1), increases a participant's total income above the minimum guarantee as his yield increases. Income here is gross value of production less fertilizer cost, calculated as :

$$Y_h = P_h Q_h - P_f F \quad \dots(2)$$

with the following definitions :

C = the insurance claim payment

\bar{Y} = the guaranteed minimum income per hectare.

Q_h, Q_t = the yield per hectare for HYV and traditional varieties

Q_u, Y_u = the upper limit for yield and income per hectare above which no payments are made

Y_h, Y_t = gross income less fertilizer costs for HYV and traditional varieties

P_h, P_t, P_f = prices of HYV, traditional varieties, and fertilizer

F = recommended level of fertilizer

k = the incentive factor where $0 < k < 1$

Income per hectare for participants will be equal to Y , and is plotted as a function of yield in Figure 2.

$$Y = C + Y_h \text{ for } Q_h < Q_u, \text{ or}$$

$$Y = Y_h \text{ for } Q_h > Q_u$$

Payments are made under the programme to all those farmers whose yields and incomes fall below the upper limit. The relationship between this upper

⁷Throughout the discussion we assume that prices remain constant so that the relationship between receipts and yield is fixed. It should be noted that this programme does not insure against price risk, rather it is assumed that other policies protect against large price fluctuations.

limit and the incentive factor and level of the guaranteed minimum income is shown below. Solve (2) for Q_h and substitute the result in (1), giving the payment as a function of the income from HYV.

$$C(Y_h) = \bar{Y} - Y_h(1-k) + kP_f F \quad \dots(3)$$

Setting $C(Y_h)$, the payment, equal to zero and solving for Y_h gives the upper limit on income, Y_u .

$$Y_u = (Y + kP_f F) \frac{1}{1-k} \quad \dots(4)$$

The payment made to any individual depends on the parameters and the yield he actually obtains. It may also be written as a function of the upper limit and his yield by substituting Y_u for the appropriate terms in (3).

$$C(Y_h) = (Y_u - Y_h)(1-k) \quad \dots(5)$$

Using (5) and an estimate of the probability that any particular yield and income will occur, one can calculate the expected value of payments, which can then be used in setting premium costs.

An estimate of the probability density function (p.d.f.) of yield for different levels of fertilizer may be obtained from a regression analysis of fertilizer-yield observation. If it is assumed that the errors are normally and independently distributed with zero mean, it can be shown that income, Y_h , is t distributed with a mean of $P_h \hat{Q}(F) - P_f F$ and a variance of $P_h^2 \hat{\delta}^2$ where $\hat{\delta}^2 = \text{var } Q_h | F$, and $\hat{Q}(F)$ is the estimated yield at a given level of fertilizer F .

$$\text{Thus, p.d.f. of } Y_h = f_s(Y_h | P_h \hat{Q}(F) - P_f F), \frac{1}{P_h^2 \hat{\delta}^2} \quad \dots(6)$$

hereafter denoted as $f_s(Y_h)$. The average claim payment per hectare is obtained by taking the expected value of the claim payment function.

$$\begin{aligned} E(C) &= \int_{-\infty}^{\infty} C(Y_h) f_s(Y_h) dY_h \\ &= (1-k) \int_{-\infty}^{\infty} (Y_u - Y_h) f_s(Y_h) dY_h \quad \dots(7) \end{aligned}$$

To evaluate this integral we transform it into a standard loss function⁸

$$E(C) = (1-k) H^{-\frac{1}{2}} L_s^*(-t) \quad \dots(8)$$

and $L_s^*(t)$ is a standardized loss function which may be written as :

$$\begin{aligned} L_s^*(t) &= \int_t^{\infty} (x-t) f_s(x) dx \\ H &= \frac{1}{\text{var } Y_h} = \frac{1}{P_h^2 \hat{\delta}^2} \\ t &= (Y_u - E[Y_h]) H^{-\frac{1}{2}} \end{aligned}$$

⁸We recognize that the lower limit should be $-P_f F$ since it is impossible to obtain $Y < -P_f F$, however the use of $-\infty$ affects the results little and simplifies the calculations.

⁹This function has been tabulated in [1].

Hence, the insurance premiums excluding administrative costs are equal to the expected payment per hectare :

$$E[C] = (1-k) H^{-1/2} L_s^* \{-(Y_u - E[Y_h]) H^{1/2}\} \dots(9)$$

IV. DETERMINATION OF PROGRAMME BENEFITS

The social benefit of the programme is the additional production resulting from the HYV. The value of the additional yield¹⁰ due to each new hectare planted in HYV can be calculated. The total net benefit of the programme for all included land is given by :

$$T = (A - A_0) B \dots(10)$$

where A = total area insured

A_0 = insured area which had been planted in HYV before the insurance plan was implemented

B = benefit per hectare (value of additional yield over fertilizer costs)

Social benefits result when $Q_h > Q_t$, and are equal to :

$$\begin{aligned} B(Q_h) &= (Q_h - Q_t) P_h - P_t F, \text{ or} \\ B(Y_h) &= Y_h - Y_t \end{aligned} \dots(11)$$

The expected value of benefits, B , is

$$\begin{aligned} E[B(Y_h)] &= \int_{-\infty}^{+\infty} B(Y_h) f_s(Y_h) dY_h \\ &= \int_{-\infty}^{+\infty} (Y_h - Y_t) f_s(Y_h) dY_h \end{aligned}$$

where $f_s(Y_h)$ is the p.d.f. previously developed. The above is a student's t linear loss function which can be shown to be

$$B = H^{-1/2} L_s^* (t') \dots(12)$$

where H is defined above and $t' = (Y_t - E[Y_h]) H^{1/2}$. Thus total net benefits in terms of income are

$$T = (A - A_0) H^{-1/2} L_s^* (t') \dots(13)$$

V. DISCUSSION OF EMPIRICAL RESULTS

An analysis of fertilizer experiments carried out at ten locations in India during the 1968 winter season¹¹ provides the basis for estimates of the cost of this programme. The ten locations are widely scattered over the country so these data are not suitable for actual implementation of the programme, but they are

¹⁰Our assumption about constant prices makes this a convenient way of measuring the social benefit. We recognize that widespread success with this programme would, even *ceteris paribus*, result in a lower product price. An approach using consumer's and producer's surplus to reflect social benefits is a possible alternative which avoids this problem but entails others.

¹¹The results used here are for the *rabi* 1968 experiments which are analyzed in [3].

illustrative. A regression of yield on nitrogen was carried out on the pooled data with the following results for the leading HYV :

$$Q_h = 3499 + 34.0F - .0822F^2 \quad R^2 = .53 \quad \dots(14)$$

(8.08) (.0391)

From (8) it is evident that the critical variables affecting the cost of the plan are the p.d.f. of the income (yield) function for the HYV, and the value of Y_u , the limit above which no payments are made. From (4) it is clear that the value of Y_u depends on the guaranteed income, \bar{Y} , and the degree of incentive for higher yields as reflected in k . The impact of the p.d.f. is exerted directly through the loss function and depends on the degree of dispersion in the experimental results. The other critical variables, \bar{Y} and k , are subject to policy decisions.

If the programme was designed to encourage farmers to apply fertilizer at their financially optimal rate as reflected in the response function (14), a rate of 176 kg/ha. of nitrogen would be recommended. This would result, with a fertilizer price of Rs. 250/- quintal and a grain price of Rs. 50/- quintal, in an expected return of Rs. 1279/ha. from the fertilizer. A much more conservative programme might encourage farmers to apply 50 kg/ha. of nitrogen to obtain an expected return of Rs. 621/- from the fertilizer. The cost of the insurance programme under these two alternative programmes and with several levels of incentives is shown in Table I.

It is clear that the "economically optimal" rate of 176 kg/ha. will result in a lower cost insurance programme. However, the other rate may well be preferred for two reasons : If the country is short of fertilizer, the true optimal rate from the social point of view will be less than 176 kg/ha. Secondly, if farmers are initially reluctant to use fertilizer, it will be difficult to encourage them to use such high rates.

The sensitivity of programme costs to the alternative values of \bar{Y} is evident in the table. If we assume that the farmer expects some yield and thus is more interested in his total income guarantee at a positive yield than he is in his guaranteed income at zero yield, then it makes sense to use a lower \bar{Y} and a higher value for k .

Our calculations show that with a fertilizer recommendation of 50 kg/ha, a \bar{Y} of Rs. 800/ha, and with $k=.25$, the expected payment cost is less than 4 per cent of fertilizer cost. This is substantially less than the cost of about 52 per cent obtained with $k=.25$ when the level of \bar{Y} is Rs. 1400 per hectare.

It would be possible to raise k higher without increasing expected payment costs unduly. Such action would increase the upper limit income level, Y_u , and as Y_u approaches $E[Y_h]$ the number of claims increases. This would increase administrative costs (not calculated). Since one objective of the insurance programme is to demonstrate the value of high yielding varieties, k and thereby Y_u should be low enough so that relatively few claims are made and the farmers regard HYV and not the insurance plan as the critical profitable component. Judicious manipulation of the variables can achieve the desired result at reasonable costs.

VI. IMPLEMENTATION

Among the challenges facing policy makers attempting to implement such a plan are the questions of where to put such a plan into effect, who should be eligible and how to finance the insurance premiums.

The major reason for proposing innovation insurance is to facilitate the adoption of profitable, although risky, innovations by small producers. A region in which all producers have already adopted the innovation would obviously be a poor choice. A region where small farmers who have not adopted the innovation are not part of the market economy would be a poor choice also. If risk is the deterrent to adoption that some claim, then policy makers should have little difficulty in finding a suitable area. Among others, many delta areas in South Asia would be suitable since producers participate in the cash market but HYV rice has not as yet been widely adopted by the small cultivators.

In implementing a programme one would like to make sure that the benefits went largely to farmers with small holdings. A limit for land of 1 or 2 hectares per family might be imposed. Also, an effective administration to verify yields and control fraud would have to be devised.

The programme could be financed with a tax on the fertilizer sold but this would be counter-productive since it would raise the price of fertilizer and increase the initial investment of the farmer. Other methods of financing, such as a tax on large fertilizer shipments (to large farmers, who would probably try the innovation anyway) or government subsidy (from general income sources) would avoid these problems and would have the benefit of some income redistribution impact in addition to increasing income and production.

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Acceptability of Male Sterilization in Bangladesh : Its Problems and Perspectives

by

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AND

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I

With an estimated 65 million couples in the world depending on sterilization as their method of birth prevention in 1975, this represents the most frequently used method [13]. The unique features of male sterilization (vasectomy) are that it is a single-application method, irreversible and highly effective. Therefore wide application of this method in the society can significantly influence the demographic trend.

However, the most notable feature of the world wide sterilization programmes has been a wide variation in the level of its acceptance between countries. High level of sterilization acceptance has not remained limited within particular cultural, religious, ethnic or geographical boundaries [13]. This indicates that large scale acceptance of sterilization may not be determined by the basic cultural, social, religious and economic factors alone. Programmatic variables thus seem to bear more important relevance to acceptance of sterilization.

II

A historical review of the trend of acceptance of voluntary sterilization in Bangladesh presents a unique educative experience. In 1965 the family planning scheme under the third five year plan (Pakistan period) had a very modest target of performing only about 600 to 1000 cases of sterilization per month as against 25,000 cases of intrauterine device.

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But subsequently, local initiatives and change in programme emphases led to on average monthly performance of sterilization at about 50,000 [7]. Even if we discount fifty per cent of the reported sterilizations, it would turn out to be 25 times higher than the originally fixed target. This indicates that appropriate programme emphasis can significantly influence the acceptance of any particular contraceptive method, at least in the initial stage of the programme.

Again in early 1977 an apparently successfully concluded voluntary sterilization campaign made notable accomplishment of performing about 75,000 cases in 70 days—an average of about 30,000 per month. But a comparison of sterilization acceptance during the post-campaign period (March to August 1977) with the corresponding period of 1976, shows a considerable decline (52.3%) in vasectomy and a slight increase (10.4%) in tubectomy—in total a significant decline [1]. This was despite the fact that there has been an increase in the number of trained doctors, clinical facilities and field workers referring acceptors, and a significant increase in Governmental commitment, in 1977 over 1976. It therefore indicates that each case of sterilization acceptance (particularly vasectomy) is costing the programme a greater effort today than it used to in the past; meaning, in other words, that acceptance is becoming increasingly difficult. We shall try to present some hypotheses here to explain the increasing difficulty in making male sterilisation more acceptable to the people of Bangladesh on the basis of some of the experiences of the vasectomy follow-up survey conducted by the Johns Hopkins Fertility Research Project [9]. This follow-up survey was conducted among selected samples of acceptors of vasectomy camps organized in Shibpur and Shalna in early 1976.

III

A potential acceptor of a contraceptive has primarily two ways of learning about the method: firstly, from the family planning programmes workers, and secondly from some one who has already used the method. In the initial stages of introduction of a new method, the source of information remains virtually only the family planning workers. But as the programme progresses enlisting a large acceptor size, gradually the past acceptors of the method become the predominant source of information. Therefore with the passage of time the social acceptance of any method depends more and more on how the earlier acceptors feel about the method. In this context we have, in our survey, asked the vasectomy clients if they felt satisfied with the vasectomy, and what is their current opinion about vasectomy as a method of birth control. Table I shows that about half the Shalna clients and about 45 per cent of Shibpur clients were found discontented 1 year after they underwent vasectomy. This contrasts with the findings of our similar

TABLE I
PERCENTAGE DISTRIBUTION OF THE VASECTOMIZED
CLIENTS OF SHIBPUR AND SHALNA CAMPING
PROGRAMME ACCORDING TO "IF THEY
WERE SATISFIED"

	Shibpur (N=304)	Shalna (N=281)
Satisfied	54.9	50.9
Dissatisfied	44.7	49.1
Unknown	0.7	0.0

follow-up study of tubectomy acceptors, in which an average 97 per cent clients reported as satisfied [15]. Table II shows that only 5.0 per cent of Shibpur and 8.5 per cent of Shalna clients considered vasectomy as a good method of birth control. The largest majority of clients expressed either a poor or a mixed opinion about vasectomy. This strongly suggests that with similar programmatic effort and strategy vasectomy is likely to become more and more unpopular, whereas, tubectomy may still remain in greater demand. In the light of above findings the recent decline of 52.3 per cent in vasectomy acceptance and rise of 10.4 per cent in tubectomy does not appear to be any surprise, because this is exactly what was predicted by us in July 1977 [9;15].

TABLE II
PERCENTAGE DISTRIBUTION OF THE VASECTOMIZED
CLIENTS ACCORDING TO THEIR IMPRESSION
OF VASECTOMY AS A METHOD OF
CONTRACEPTION

	Shibpur (N=304)	Shalna (N=281)
Good	5.0	8.5
Mixed	50.3	64.1
Poor	42.3	21.7
No opinion/Unknown	2.0	5.7

Causes of Satisfaction or Dissatisfaction

The follow-up survey also investigated into the causes of satisfaction or lack of it. Table III shows that most of the clients stated as the reason for satisfaction

TABLE III
PER CENT DISTRIBUTION OF THE VASECTOMIZED CLIENTS
ACCORDING TO THE REASON FOR SATISFACTION
OR DISSATISFACTION

	Shibpur (N=304)	Shalna (N=281)
Satisfaction		
Wanted birth control	48.0	45.6
Indifferent	1.3	1.4
No complication	2.0	0.7
Received money	1.7	1.1
Other	2.4	0.3
Dissatisfaction		
Inadequate information	0.3	0.4
Guilt conscience	1.0	0.4
Wants more children	3.0	1.8
Sexually weaker	7.6	1.8
Decreased ability to work	19.9	4.6
Did not get all help expected	10.9	24.9
Combination of above	2.6	12.5
Unknown	0.3	0.0

that they "wanted birth control". This means, those who had a perceived need for birth control, also had reasons to be satisfied when they successfully acquired it. One of the most frequent causes of dissatisfaction was that they did not receive all the help they expected. We know all clients in the camps received some cash money, a blanket and also few items of food like wheat or milk; altogether these amounted to a benefit which was greater than what used to be given in the past. But despite this, a sizeable fraction do not appear to have met with their expectation, which suggests that the family planning recruiters perhaps made false or exaggerated promises in order to persuade the clients to accept the method. Another frequent cause of dissatisfaction was decreased ability to work. We

know there is no physical explanation why vasectomy should lead to decreased ability to work. But from programme's point of view it is significant that clients attribute their decreased ability to vasectomy. This may also indicate that counselling and follow-up has been inadequate and inefficient. Essentially, the differences in the expressed reasons for dissatisfaction between the Shibpur and the Shalna clients may reflect the differences in the qualitative aspect of the counselling and educational effort made in the two campaigns.

Pain during Surgery

Table IV shows that 30.6 per cent of the Shibpur and 18.9 per cent of the Shalna clients experienced severe pain during the surgery. The incidences of severe

TABLE IV

PER CENT DISTRIBUTION OF THE VASECTOMIZED CLIENTS ACCORDING
TO EXPERIENCE OF PAIN DURING SURGERY AND COMPLAINS
IMMEDIATELY AFTER SURGERY

	Shibpur (N=304)	Shalna (N=281)
Pain during Surgery		
None	5.9	18.9
Slight	47.8	38.8
Moderate	15.8	23.1
Severe	30.6	18.9
Unknown	0.0	0.4
Complaints Post-surgery		
None	25.0	26.3
Pain	29.3	15.0
Swelling	38.5	31.3
Infection	4.9	0.4
Weakness	2.0	16.0
Unknown	0.3	1.1

and moderate pain together stood at 46.4 per cent of Shibpur and 42.0 per cent of Shalna clients. This reported incidence of pain experience appears to be considerably higher than what is reported from other countries [3; 10]. If we consider pain among our clients as a subjective response determined as a compromise

between the actual physical trauma they experienced and what they were given to anticipate, then this high incidence of pain would indicate inefficient counselling and education and thus inadequate psychological preparation. In order to persuade the prospective acceptors more easily, the recruiters are often known to describe vasectomy as simple as an injection. In a sterilization follow-up survey in Matlab about 34 per cent of the vasectomy acceptors and 12 per cent of tubectomy acceptors reported that the procedures were described to them as a mere injection [12]. In such instances clients are psychologically prepared for what would be an injection, and consequently they feel disproportionately greater intensity of pain.

Past Use of Contraception

Table V shows that only a fraction of our clients in sample (5.2 per cent of Shibpur and 2.5 per cent of Shalna clients) had used some contraception before vasc-

TABLE V

DISTRIBUTION OF THE VASECTOMIZED CLIENTS ACCORDING TO THEIR PAST CONTRACEPTIVE PRACTICE AND CURRENT PRACTICE

	Shibpur (N=304)	Shalna (N=281)
Ever Used		
None	93.8	97.5
Oral Pill	3.3	1.4
Condom	0.7	0.0
IUD	0.7	0.4
Safe Period /withdrawal	0.3	0.0
Wife Sterilized	1.0	0.7
Unknown	0.3	0.0
Used Immediately Before		
None	98.7	98.9
Yes	1.3	1.1
Unknown	0.0	0.0

tomy. This is substantially lower than the percentage of reproductive couples known to be using contraception in Bangladesh [8 ; 11]. It therefore appears that the vasectomy acceptors were never exposed to the concept of birth control and did not show evidence of their interest in birth control during their past reproductive life. This contradicts the principle that anyone who did not use contracep-

TABLE VI

PERCENTAGE DISTRIBUTION OF TUBECTOMY CLIENTS ACCORDING TO THEIR PAST CONTRACEPTIVE PRACTICE AS REPORTED IN DIFFERENT STUDIES

	One Year Follow-up Survey			Clinic Based Study		
	Kaliakair	Model Clinic	Ballavpur	Model Clinic	DMCH	BAVS
	(N=170)	(N=147)	(N=204)	(N=364)	(N=350)	(N=1230)
Ever used	54.0	84.4	58.9	—	—	—
Used immediately before	21.0	60.5	33.1	41.5	12.3	20.7

tion in the past should not be accepted for vasectomy straightaway because such clients may later regret [2]. This difference in the past contraceptive practice experience between the vasectomy and tubectomy acceptors may partially explain the difference in the level of their satisfaction with the procedure.

Sexual or Physical Incapacity

Table VII shows that 68.8 per cent of Shibpur clients and 57.3 per cent of Shalna clients reported a decrease of sexual or physical capacity. Most other

TABLE VII

PERCENTAGE DISTRIBUTION OF THE VASECTOMIZED CLIENTS ACCORDING TO THE MOST IMPORTANT CHANGE NOTED AFTER VASECTOMY

	Shibpur (N=304)	Shalna (N=281)
Sexually weaker	29.0	14.2
Sexually stronger	0.3	0.4
Working capacity decreased	39.8	43.1
Sexually dissatisfied	0.7	0.4
No change	30.2	42.0

Asian studies have also shown a decrease in sexual capacity or activity [6; 14]. As a probable cause it has been said, "This could be the result of mass vasectomy campaign without proper motivation" [5]. This high incidence of decreased sexual and physical ability seems to be related to the high level of dissatisfaction, as their decreased ability can lead to dissatisfaction as stated earlier, as well as the general negative attitude may contribute towards sexual and physical incapacity.

city. Another consideration is that in our society animals are known to be castrated, and historically harem guards used to be castrated. This may have created a sub-conscious or conscious repulsion towards castration with which vasectomy may easily be confused, particularly when educational programme is weak and inefficient [4]. To what extent this sub-conscious equation of vasectomy with castration have led to a decrease in sexual capacity could not be ascertained. This however remains an issue for future investigation.

Primary Reason for Accepting Vasectomy

Very poor level of motivation is also evident from the fact that about 40 per cent of Shibpur and 60 per cent of Shalna clients mentioned financial help as their primary reason for accepting vasectomy (Table VIII). In fact only about

TABLE VIII

PERCENTAGE DISTRIBUTION OF THE VASECTOMIZED CLIENTS ACCORDING TO THE PRIMARY REASON FOR ACCEPTING VASECTOMY

	Shibpur (N=304)	Shalna (N=281)
Birth Control	49.3	31.5
Financial help	39.8	59.6
Fear or perceived force	8.9	6.8
Did not know what the operation was about	7.6	4.9

a half of the Shibpur clients and a third of the Shalna clients accepted vasectomy for reasons of contraception. Thus it appears that financial inducement can potentially attract men who otherwise did not have any serious urge to limit the size of their family, which can further worsen if vasectomy is described as a simple procedure like an injection. Under such circumstances when the clients exhaust the financial gain they earned on account of vasectomy they have nothing left to be satisfied with.

Problem of Childlessness

Another consequence of improper recruitment is reflected in Table IX, which shows that 3.3 per cent of Shibpur and 0.4 per cent of Shalna client did not have

TABLE IX

DISTRIBUTION OF THE VASECTOMIZED CLIENTS ACCORDING TO THE NUMBER OF LIVING CHILDREN AND SONS THEY HAVE AT THE TIME OF INTERVIEW

Number of Living Children/Sons	Living Children		Living Sons	
	Shibpur	Shalna	Shibpur	Shalna
0	3.3	0.4	9.9	5.7
1	4.9	2.1	23.4	23.5
2	10.9	7.1	34.5	31.0
3	17.4	18.2	18.4	19.2
4+	63.5	72.2	13.8	20.6
Mean	4.1	4.8	2.5	2.4

any children at all, and 9.9 per cent of Shibpur and 5.7 per cent of Shalna clients did not have any son. The Matlab survey also reported that 6 per cent of vasectomy acceptors as against 0.7 per cent of tubectomy acceptors had no son at the time of sterilization [12]. In the absence of any future prospect to bear children these childless and sonless couples are likely targets of serious frustrations and and dissatisfaction. Although most of the childless couples became childless because of child death subsequent to vasectomy, there were evidence that some of the Shibpur clients were childless at the time of vasectomy, who stated that they had living children only to qualify for vasectomy. Obviously these unfortunate men did not have the opportunity to know the implications of the procedure. They heard that money was given to the men who came in for an injection. Overall

rate of post-vasectomy childlessness strongly suggest the need for more rigid acceptor screening criteria.

VI

In the light of above findings, we may expect to encounter progressively waning reputation of vasectomy unless the programme strategy is changed. Any long term strategy to make vasectomy acceptable in Bangladesh should, therefore, include the following elements : greater emphasis on education and persuasion rather than allurements ; mandatory counselling explaining to every potential acceptor the true nature of its procedures and implications, especially focussing on its irreversibility ; dispelling any doubt that vasectomy can impair sexual potency or physical ability; and enforcement of a more rigid screening system which takes into account wife's age and reproductivity, living children, past contraceptive practice and current knowledge of contraceptives.

All the above measures are likely to result in substantial decline in the level of vasectomy performance temporarily, but we have to accept this as a necessary price for eventual success, because this will provide the only opportunity for rescuing vasectomy from utter disrepute. Additionally, long-term follow-up studies should be conducted at regular intervals of 6 to 12 months to monitor any changing trend in the overall reputation of vasectomy.

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Some Comments on "A Development Perspective for Bangladesh"

by

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Professors J. Faaland and J.R. Parkinson have presented a development scenario for Bangladesh in a recent paper, "A Development Perspective for Bangladesh", published in the January 1976 issue of this Journal [3]. This scenario, covering the period 1975-2000, is certainly a very bold and imaginative exercise in tracing a plausible development 'path' but its main emphasis seems to be on quantifying the amount of aid requirements of Bangladesh over this period if she wanted to follow that specific 'path'. The authors have done a valuable job for a country which is increasingly, but unwisely, becoming aid-dependent.

In this short note, we shall briefly discuss the following aspects of the Faaland-Parkinson exercise : (i) The nature of their model, (ii) The burdens of foreign aid and the repayment capacity of the economy, (iii) The employment consequences of their model, and (iv) The income distribution implications of their model.

(i) The Nature of the Faaland-Parkinson Model. The basic model behind their development scenario is essentially deterministic. If one asks the question : how reliable are their calculations, one simply does not know what to expect. The world is essentially stochastic and the development process is specially vulnerable to all kinds of uncertainties. A deterministic model to project the future development of an uncertain world is not of much help. If one remembers the vast gulf that was found between the similar perspective planning calculations in the series of plans of India, Pakistan and Bangladesh and what was actually realised at the end of those plans, one wonders whether this kind of exercise deserves the efforts it needs !

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Further, what the authors have done is a terminal year exercise, which cannot be seriously considered a development path. That is, the model has been fed with the relevant data of 1975 and solved for 1980, and similarly for the other five-year periods. This does not give any clue as to how the economy is supposed to move in the intervening periods. In this kind of exercise, the economy is assumed not to have any adjustment problem during these years except in the initial and the terminal years. What the authors could at least have done was to introduce appropriate lags in the major functional relations of the model and then found the solutions of the dynamic process involved in a sequential manner. That would have given a meaningful idea of a development path the parameters of which could be studied in a sensible way. As it is, the arbitrary division of a long period into five sub-periods and to find five sets of terminal-year solutions does not capture the issue of a development process which is essentially dynamic.

(ii) The Burdens of Aid and the Repayment Capacity. According to the projections of the model, the net capital imports of the country will grow from \$800 million (U.S.) in 1975 to \$980 million in 1980, to \$1310 million in 1985, to \$1465 million in 1990, to \$1570 million in 1995, and finally to \$1570 in 2,000 (Table II). These dollar values are in 1974 prices. As the authors say, the aid flows will have to be larger than these figures because the country has already existing debts (inherited from Pakistan) to service and "dependent on what proportion of the foreign assistance placed at her disposal is in the form of loans and the terms on which these are made, a considerable burden of debt service could accumulate by the year 2000" [3, p. 61].

The most fundamental question that one has to raise now is : how can Bangladesh repay these (roughly \$ 40 billion) debts ? The authors have no answer to this question. What is far worse, they have not even shown the expected rate of growth of exports of the country over the period. It is a simple truth, and yet most fundamental for understanding the development process of any country, that if exports do not grow sufficiently faster than the imports (at least in the later periods), then the countrys' development process, whichever way it is generated, (private capital imports or aids), cannot be sustained. The cases of India and Pakistan should be eye openers to the development economists. After twenty-five years of massive inflows of aids and private capitals, the burdens have increased so much out of proportion to the relative growth of exports that the major preoccupations of these countries now have been to appeal to the donor countries to reschedule their debt servicing obligations. Those who are aware of the ex-

ponential nature of the growth of interest burdens of a given capital sum after the initial period and of the capital repayment problem, will appreciate what a painful and humiliating situation the country has to go through when it enters this phase. It has to beg the donor countries either to write off the loans or to reschedule it over a longer period. The former implies the total loss of any self-respect that the nation may have while the latter gives only an illusory breathing space. The problem reappears in a sharper form as time goes on. Even if rescheduling is permitted, the debtor countries have to swallow every dictate of the donor countries in respect of exchange rate, domestic interest rates, money supply, public expenditure, wage rates and various forms of taxes and subsidies. The example of Britain having to undergo the pressures of the creditor countries (and also the IMF) to devalue, to control money supply, to cut government expenditures and to control wages and prices etc. should be illuminating. Closer to the home ground are the examples of pressures exercised by the creditor countries leading to the devaluation of India in 1966 and of Pakistan in 1973. Many similar examples can be quoted. One should not, of course, consider the creditors as villains. The creditors have to safeguard the value of their capital and hence the pressures from the creditors to keep the currency of the borrowing country at par with its real value in terms of the world currencies. The rules of the lending-borrowing game is such that the debtors have to be at the mercy of the lenders. The point here is that a country which is heavily in debt cannot take any major economic decision independently of the wishes of the creditors. When one suggests a heavily aid-dependent development strategy to Bangladesh for a quarter of a century, one is recommending to it that state of indignity. No self-respecting nation can accept it. Of course, beggars can't be choosers. The question is : should Bangladesh be in that state of perpetual begging ?

Some may argue (specially the aid lovers of Bangladesh) that these debts will eventually be written off by the donor countries and hence why worry about it. Instead of worrying, raise as much aid as possible. Let us examine the consequences of this strategy carefully.

Suppose for a moment that the aid-givers are willing to write off all the loans. Will the economy be self-sustaining from that period onward ? The answer is clearly no. For in the terminal years of the period, the economy may generate sufficient rate of savings (18% of the GDP in Bangladesh according to the Faaland-Parkinson model) but there may still be a "critical foreign exchange gap" in the sense of Chenery and Strout [2]. It is easy to visualise that the stipulated aid-flow of over \$1.5 billion per year will generate new industries, outputs, savings and investments which in their turns will generate a growing demand for capital

equipments and industrial raw materials from abroad. Unless there is a simultaneous development of a capital goods sector within the economy, which is not a feature of the Faaland-Parkinson model, the country will have to be dependent on continuing flow of foreign aid to meet this growing demand. The generation of savings (18% of GDP) will mostly be in domestic currency and not in the form of export surplus and hence is not a sufficient condition for sustaining the momentum of growth sparked-off by foreign aid. The entire development strategy ought to be export-oriented rather than aid-oriented.

What is far more objectionable about aid is that it destroys the incentive among recipients to do hard work which is the only source of economic strength and efficiency. Aid is the opium of our time; once anyone is addicted to it, it slowly destroys his sense of competitive survival and self-respect.

Further, from the point of view of taste formation and demand creation aid has a disastrous effect on the economies of less developed countries (LDC's). The referral role of consumption behaviour is played by the rich and the upper middle classes of the society. By virtue of wealth-ownership pattern, power sharing and education, this class of people dominates the business and government of the country. When aid comes in, it goes through these people. By and large, they are the first set of beneficiaries of aid. Easy money leads to higher consumption levels, but the type of goods they consume are mostly the expensive and sophisticated foreign goods. For example, instead of using local transport, locally produced clothes, drink and tobacco etc. they would buy foreign cars, clothes and drinks etc. Instead of sending their children to local educational institutions, they would send them to foreign schools and universities. There is a sudden shift of consumption standard of this class from domestic to foreign goods which is imitated by the lower income group as its own income level increases slowly. Such an increasing demand for inessential imports at a time when exports remain relatively stagnant has a disastrous effect on both the domestic price structure and the balance of payments. The development process of the country can be frustrated if the taste formation and demand generation are in conflict with the domestic resource base. Aid certainly contributes to this process.

Finally, the economy needs some fundamental changes like land reform, and streamlining of many overmanned industries and government corporations. Because of the abundant supply of aids, these essential structural changes are never brought about and hence inefficiencies are perpetuated. In the absence of aid, the government would have been forced by circumstances to adopt some

drastic measures to improve economic efficiency all around. Aid simply postpones these essential measures.

(iii) **The Employment Consequences of the Model.** According to Faaland-Parkinson calculations, the unemployment in Bangladesh in 1975 was 8 million man-years out of a total of 27 million man-years and the corresponding figures for the year 2000 will be 20 million unemployed out of 56 million labour force [3, p. 62]. These calculations seem to be on the lower side. Nevertheless, if one accepts these, one finds that the rate of unemployment will increase from 29.6% in 1975 to 35.9% in 2000. This situation is going to develop in spite of an annual rate of injection of about \$1.5 billion over the entire 25 year period. The socio-political implications of these estimates are simply frightening. Professors Faaland and Parkinson have shown awareness of this prospect [3, pp. 87-88] but no solution as an integral part of the model appears anywhere.

How to eliminate such a high rate of unemployment? The neo-classical economists have a pet answer: increase investment and decrease population growth. We take the view that although these are not the ultimate solutions, one should keep on trying these. Firstly, the economic factors have little to do with population growth; and even if a population control programme is launched on a massive scale spending billions of dollars, by the time it becomes effective in reducing the rate of growth of population it will take decades. In the meantime, the high population growth and the existing unemployed can create a havoc in the society. Further, where will these billions of dollars come from? The amount of money, trained man-power and technical equipment needed for effective population control are almost beyond the availability limits of resources of countries like India, Pakistan and Bangladesh etc. Foreign aid on a massive scale only for population control programme is not a feasible solution either. So, it has to be taken up as a partial measure which can yield only a partial success.

The next question is: if population cannot be controlled effectively, can investment be increased so much so that the unemployment rate can be reduced to a tolerable level like 6% or 7% (as it now exists in some developed countries) in 25 years, let us say? The straight answer is no. As the Faaland-Parkinson model has shown, even if a massive investment programme of \$1.5 billion a year over the quarter of a century is carried through the unemployment rate goes up instead of going down. An investment programme larger than this is beyond the limits imposed by technical feasibility as well as resource availability (both nationally and internationally). The neo-classicists may still argue that a simul-

taneous attack on both the problems should be made. If inoptimal amounts of financial and technical resources are employed in tackling two unmanageable problems the results will necessarily be inoptimal and unsatisfactory anyway. Therefore, the neo-classical solution will not work in the crisis-ridden situation of Bangladesh. We take the view that neo-classical economics breaks down here and Bangladesh will have to try something else also for her sheer survival.

(iv) **The Distributional Consequences of the Model.** Closely related to the unemployment situation is the income distribution aspect of the model about which Professors Faaland and Parkinson have said nothing very substantial. Their main concern is per capita income growth through a massive investment programme financed by foreign aid. This is a typical neo-classical approach which sees income distribution in a society as the consequence of (efficient) resource allocation. The famous duality theorem, which is the most modern and sophisticated version of the old marginal productivity theory, tells us that the total output of an activity will be distributed among the participating inputs according to their respective marginal productivities. It is obvious that in a capital scarce and labour-abundant country like Bangladesh, the marginal productivity of capital will be high while that of labour will be low. What follows from this is a pattern of income distribution in the society governed by the relative abundance and scarcity of factors of production. The neo-classicists, therefore, have to be satisfied with whatever pattern of income distribution exists in a private wealth-owning system and whatever pattern develops through the operations of the market economy. So, if the initial income distribution is skewed and the subsequent economic dynamics makes it more skewed the marginal productivity theory cannot issue any injunction against it. What it implies is that the establishment of any kind of economic justice through redistribution is not within the domain of neo-classical economics. No wonder, the staunch neo-classicists resent the post war practice in some developed countries (specially in Britain and Sweden) of redistributing wealth and income from the rich to the poor through progressive taxation and welfare payments etc. Let us also say that this marginal productivity theory does not work even in the developed countries. For example, in the settlements of wage bargains in the western countries one notices that both the productivity increase as well as the anticipated and unanticipated rate of inflation enter as major determinants. This inflationary adjustment of wages cannot be wholly attributed to marginal productivity of inputs.

Further, from the experiences of the development of the LDC's of the last quarter of a century it has been found that the development process instead of

“trickling down” the benefits to the poorest segments of the population generates a “trickle up” process from the poor to the richer sections of the society [1, pp. 302-313]. The findings of Adelman-Morris [1] show that in the early stages of development, it is the economic structure which contributes more to the growing inequality than the level or the rate of growth of the economy [1, p. 186]. What is the existing economic structure of Bangladesh now? The top 20% of wealth-owners own about 70% of the country’s total wealth while the bottom 20% own about 5%. If in this type of extremely skewed distribution the Faaland-Parkinson type of development is pushed through, it is obvious that the rich will get richer while the poor will get poorer. The unemployment consequences of the model, which we have discussed above, reinforces this conclusion. When the pattern of income distribution will be more skewed and the unemployment rate will go up from 29.6% to 35.9% at the end of their period of development, the strain on the socio-political fabric will be so explosive that the political upheavals like those in 1968/69 and in 1971 (in the days of Pakistan) are likely to occur much more frequently. The application of the neo-classical economics will lead to such consequences.

The upshot of the foregoing analysis is that a country like Bangladesh cannot accept Faaland-Parkinson type model, because it cannot provide any solution to the country’s acute problems of (i) debt repayment, (ii) unemployment, and (iii) income distribution. One would not like to see Bangladesh becoming a vessel state after 25 years of development efforts; nor would one like to see it going through series of political upheavals caused by the phenomenal increase in unemployment rate as well as by the adverse pattern of income distribution during the course of its development. Such upheavals not only destroy the socio-political stability, which is badly needed, but also a lot of precious economic overheads and skilled human beings in the process. If one wants to avoid these and also wants to promote genuine welfare of the people (not simply in terms of income per capita) then a development strategy will have to be designed by taking explicit account of distribution, national self-respect as well as growth.¹

¹ We shall try to develop fully the basic structure of this new strategy in a future paper.

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Surplus Labour in Bangladesh Agriculture—A Comment

by

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AND

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I. INTRODUCTION

In view of the seasonal character of employment in agriculture and of the complementarity of labour required during different seasons, the usefulness of aggregate measures of unemployment or surplus labour in agriculture is at best limited [3]. A recent paper by Muqtada [4] contains one of the very few attempts made to investigate the seasonal pattern of employment in Bangladesh and to estimate surplus labour during peak seasons. Unfortunately, this paper is plagued with serious methodological errors which render the estimates meaningless. More concerning is the fact that these errors have caused a severe underestimation of the 'transferable' surplus labour in agriculture. In fact, the author has arrived at a negative figure for such surplus—a result which is quite misleading. The purpose of this note is, therefore, twofold : (i) to point out the methodological errors contained in [4], and (ii) to show, by using a simpler and more direct method, that a considerable amount of surplus labour exists in agriculture even during the peak season.

II. UNEMPLOYMENT RATE—FOR WHOM ?

Unemployment rate can be calculated only for a group of people when total information about their employment pattern is available. Similar calculation

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can be done for a given area (e.g., village, state, etc.) once such a geographical set is defined by its resident components and the latter's employment pattern is also known.

In the paper under discussion, transferable surplus labour and the percentage of unemployed man-months have been calculated for 147 farms in Dinajpur. These calculations are based on the data of fully employed workers¹ working on these farms during each month. These 147 farms or the fully employed workers working on them do not, however, form a closed set. And as such, the given set of data cannot be used for calculating the unemployment rate. For, we only know that a certain number of workers were fully employed for a given number of days on these 147 farms. We do not know whether they worked in other places. Probably they did, for there were many workers who came from other places or other occupations to work in these farms during peak seasons (p. 421). Such farm data on an open set of individuals cannot conceptually be used to calculate unemployment rate for a group of workers.

In the absence of any information on what these workers do at other times, the author has used quite an ingenious method for calculating the total supply of labour. The author has assumed a rate of unemployment for these farms (which is equal to the national rate) and worked out what the supply of labour would be, had full employment prevailed. Even in this procedure, an additional number of man-months supplied by at least some of the workers working in other farms should have been added to get the total supply of labour. If x man-months were supplied to crop production in other farms, and $1/3 x$ man-months to livestock and fisheries then the total supply of labour according to the author's procedure would be $\frac{1,046 + 349 + x + \frac{1}{3}x}{60.2} \times 100$ instead of the expression in line 1 of Table XVI. This procedure for calculating the supply of labour is however, erroneous and to this we now turn.

III. SUPPLY OF LABOUR

Two methods have been used to calculate the supply of labour: one for the purpose of estimating the percentage of transferable surplus (p. 421) and the other for the purpose of estimating the percentage of unemployed man-months (p. 423). And unfortunately, both of these methods are faulty. In the first case, an assumed percentage of employment has already been used to calculate the total number of labourers. This in turn has been used to calculate the rate of unem-

¹The method of obtaining this data has been described in [4, p. 421]

ployment during the peak season in the sample farms. There is thus a circularity of reasoning involved in the process.

In addition, there has been an undesirable mixture of data from different samples which could have been avoided. An estimate of total agricultural employment for the country as a whole has been obtained by using a figure for average man-hours/per cropped acre (taken from a study of some sample farms in Mymensingh). The unemployment rate thus obtained has again been applied to Dinajpur data to obtain the 'transferable surplus'. But the author's own calculation (p. 423) shows that unemployment rate for the Dinajpur farms is much higher than the national figure. If this higher rate were used for calculating the supply of labour, the resulting figure would have been much larger than that shown in Table XVI.²

Apart from this, the calculation of the number of labourers (N) as

$$N = \frac{L}{12} \quad \dots(1)$$

(where L is the total number of man-months supplied) is erroneous.³ For, a constant number of workers need not work for 12 months in order to supply a given total of man-months. In fact, there could be a larger number during the peak season and a smaller number at other times, and yet a total supply of L man-months.⁴

The appropriate procedure should have been to find out directly the number of labourers available in the sample farms and compare this with the number of labourers required in peak season to arrive at a figure for the transferable surplus. Since the primary data obtained from the sample survey are not available to the present authors, this calculation could not be done. However, even if we assume that the average number of labourers per sample household is only 1.5 (which

²However, we are not doing this calculation here because, as we shall show below the method of obtaining unemployment rate for the Dinajpur farms is also faulty.

³In the paper under discussion, L has been wrongly worked out to be 2315. Actually, it should be 2317.

⁴Such non-uniform supply seems more plausible if we take into account the fact of regional variation of peak seasons and the movement of workers from one place/occupation to another during different seasons. For evidence of such regional migration, see [3].

was the average number of earners per rural household in 1965) [2], the total number of labourers in 147 farms works out to be 220. And since the number of labourers required in the peak season has been found to be 195 (p. 421), the percentage of unemployed (or the transferable surplus) should be at least 11%.

Now, we come to the second method used by the author for calculating the supply of labour. Here, the supply of labour during the entire year has been assumed to be equal to the peak period labour requirement.⁵ Moreover, the calculation of the total supply of labour (author's S) as

$$S = L_p \cdot 12 \quad \dots (2)$$

(where L_p is the number of man-months required during the peak season) assumes that all workers working in these farms during the peak season are tied to these farms and did not move to other farms/occupations during slack season. This, however, need not be true. The author himself recognizes that if there is any shortage of labour during the peak season, people from other occupations and/or places move in to work here (p. 421). During the slack season, such temporary workers will obviously move to their original place/occupation. In such a case calculation of S by using equation (2) would be inappropriate.

Most important from the point of view of surplus labour estimation is the fact that when the effective equilibrium demand and supply data are used, any attempt to calculate such surplus is simply begging the question. Here again, a direct information about the number of labourers in the sample households would have been the most appropriate figure to work with.

IV. PEAK SEASON DEMAND FOR LABOUR

This calculation in Table XVI also suffers from a deficiency. The author has assumed that labour required for livestock/fisheries remains uniform throughout the year. This, again, may not be true. Employment in fishing, for example, depends on rains, level of water, tidal situation, etc. Employment on livestock also varies—more attention is given to them during slack seasons in

⁵This contradicts the author's own calculations in Table XVI where total number of labourers have been calculated to be 193. If we concentrate on crop production only, this works out to be 145. But calculations in page 423 assumes a supply of 160 workers.

crop production. One of the present authors has shown elsewhere that peaks in crop production are normally accompanied by slacks in other activities like fishing [3]. There is thus a possibility that by assuming labour requirement in non-crop agriculture to be spread uniformly throughout the year, the author has in fact over estimated the demand for labour during agricultural peaks.

V. CONCLUSION

It must be clear from the above discussion that the estimates of surplus labour presented by Muqtada [4] suffer from serious methodological errors. These errors have caused a severe underestimation of the supply of labour on the one hand and an overestimation of the demand for labour on the other. Hence, there must have been a gross underestimation of the amount of 'transferable surplus' in agriculture. Even a conservative estimate made by us has indicated that at least 10 per cent of the labour force in the sample farms may be regarded as surplus during the peak season. This is also consistent with other estimates of peak season surplus [1; 3] and the theoretical explanation for the existence of such surplus [5].

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Surplus Labour in Bangladesh Agriculture—A Reply

by

M. MUQTADA*

I

On reading the comment by Islam and Rahman [1] on my article published in an earlier issue of this journal [2], I get the impression that the authors are too quick in their appreciation and overtly confused in many respects.

Their arguments are connected principally to the estimation of (i) the supply of labour, and (ii) peak season labour demand. But before that, they have questioned the validity of the derivation of the unemployment rate for the set of 147 farms used in the study on the ground that these do not "form a closed set". It would be worthwhile to point out two things here. Firstly, on the question of a set, it must be appreciated that any economic analysis is almost bound to involve a level of aggregation (or for that matter, disaggregation), and the crucial issue would then be to show that such aggregation or disaggregation approximately balances with the issue at stake. Secondly, I indeed, fully agree with Islam and Rahman when they point out the conceptual difficulties associated with the use of farm-level data in the estimation of the unemployment rate, but it must be emphasized further that no amount of empirical rigour would be able to match a concept, not even their stated criterion of a closed set. Bearing these in mind, the 147 farms used in the study have been randomly selected from a survey of a village in Dinajpur. While the authors appreciate the problems of estimation on account of "the absence of any information on what workers do at other times" (i.e., a comprehensive knowledge of the availability of labour), they, in the same breath, ask for an addition of a "number of man-months supplied by at least some of the workers working in other farms", i.e., the expression, $x + 1/3x$. I do not understand why such an addition should not be arbitrary. In other words to close the "set" we would have to speculate

*The author is grateful to I. Ahmed for useful discussion.

on all available labour in and out of the 147 farms.¹ It is precisely to cut short the number of speculations that an indirect procedure has been used to provide a rough and ready estimation of the "truly surplus" [2, p. 149].

II

Given the total demand for labour the supply of labour has been estimated by using the surplus labour proportion, as obtained for entire Bangladesh. From this, the extent of "transferable surplus" is obtained, given the peak season demand. The basic assumption involved here is the equating of the unemployment rate for our sample with that for overall Bangladesh agriculture. Given this assumption, and which is not too implausible, the same surplus labour proportion may very well be used in deriving the surplus of the "busy season" for any number of samples, provided the peak season labour demand for each is available. One may allege a margin of error due to regional variations, but the question of circular reasoning as alleged by Islam and Rahman does not arise at all.

The authors have next pointed out that there has been "an undesirable mixture of data from different samples". Such an allegation is also rather unwarranted, and is tangential to the thrust of the argument. The average labour requirements, in terms of man hours per cropped acre (i.e., 650), has been taken, as stated from Stern[3] who has applied this figure to estimate unemployment rate for 1960/61. This average labour demand per cropped acre could safely be used to obtain the unemployment rate for 1969/70 because, as we have mentioned, the rate of adoption of the new technology in Bangladesh agriculture till then was rather limited. The study of the sample farms from Mymensingh, done for 1969/70, appears to confirm the average per-acre labour demand. Because of the inadequacy and the fragmentary nature of evidence, mentioned on more than one occasion in my article, the same set of farms could not be retained for further analysis. Fortunately, the crucial issue is not the introduction of a second sample set, but whether we can plausibly use Stern's finding of 650 man hours/cropped acre for estimates of unemployment in Bangladesh agriculture for 1969/70. Viewing that Stern's figure is for 1960/61, this must be a very conservative assumption, whether for Mymensingh or Dinajpur, since we are assuming away any changes in labour demand over the period.²

¹Nowhere has it been claimed that workers from other places have actually been demanded by the 147 farms during peak season. Even if they did, the addition of $x+1/3x$ could still, as a matter of course, be regarded arbitrary because strictly speaking, it is quite possible to imagine a situation where labour from the "set" does not go out while outside labour is brought in.

²Stern himself has assumed a labour demand of 775 man hours/cropped acre for 1969/70 [3]. This would imply, in our context, a lower surplus labour proportion and hence an even smaller 'transferable surplus'.

Islam and Rahman are totally confused, and have missed out my analysis completely, when they bid me to use the unemployment rate for Dinajpur instead of the one for entire agriculture. The entire exercise in this section has been to estimate the supply of labour whence we obtain the 'transferable surplus' for the Dinajpur farms.³ The estimation of the surplus man-months for Dinajpur, has been done to bring out the seasonal component of surplus, *albeit* on purely hypothetical terms. How can one take this figure to derive the transferable surplus, when, in fact, the figure itself has been derived on the assumption of zero transferable surplus (i.e., supply equal to 'peak season' demand)! The confusion of the authors is even clearer in their footnote. Incidentally their contention there with numbers, if worked out, would show a vastly reduced surplus labour proportion (and hence even smaller 'peak season' surplus), and would throw overboard all their efforts at increasing the gap between supply of and demand for labour at the seasonal peaks.⁴

Another point objected to by the authors is the use of uniform supply of labour ($N=L/12$) over the year. No one need dispute with that so long as precise information on the non-uniform supply is available. But even a non-uniform supply function cannot, *a priori*, rule out a 'peak period' shortage, because after all the supply of labour in peaks (whether through migration or any other mode) is only in keeping with the high demand for it.

In another occasion, the authors argue that in assuming a uniform labour requirement for livestock/fisheries (one-third of that in crop production) over the year, the demand for labour for the peak season has been over-estimated. Again, no *a priori* judgement is possible, although information on the actual pattern of employment in non-crop agriculture would be very useful. One, for instance, wonders whether the livestock is left unattended during the 'peaks' of crop-agriculture. But precise and realistic estimates of such employment are rather hard to obtain, and any categorical conclusion on the basis of a single sample study, as done by one of the authors, would remain dubious.

III

It was precisely because of the non-availability of data on the supply of labour, that the indirect procedure in our analysis was adopted. In purporting to offer an alternative procedure, the direct method, the authors of the comment

³See [2, p. 42].

⁴The authors have rightly pointed out an arithmetical error in one of my calculations. Such a mistake was inadvertent. Fortunately, it has not distressed us either with respect to our findings or our arguments.

have simply emphasized what could have been done if more direct information were available. In the absence of such data, they have assumed an average number of 1.5 labourers per household and thus arriving at the total supply of labour (i.e., 220), the transferable surplus is obtained on the basis of peak season demand (195),—which works out to be “at least 11%”. It is not understood why this should be, as the authors claim, a “conservative estimate”. In point of fact, the authors themselves state that 1.5 is the average number of earners per rural household, and not per agricultural household. Further, the ultimate result would prove highly sensitive to the slightest change in this average number. Most importantly, however, their direct approach does not obviate the problems they have raised in their comment, particularly with respect to the issue of a “closed set” or the non-uniformity of the supply function of labour.

In conclusion, I must emphasize that the real purpose of my paper was to posit a few questions upon the introduction of new technology in Bangladesh agriculture within the present milieu of labour demand and supply. In this regard, we observed the issue of seasonality, and examined the nature of the labour demand curve, as would bear implications in the context of the adoption of new technology. The estimation of a negative ‘transferable surplus’ was not where my efforts solely lay. What one must appreciate is the logical sequence to such an estimation, rather than the spurious sense of accuracy about it.

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Book Review

Population and Planning in Developing Nations—A Review of Sixty Development Plans for the 1970's, by B. Maxwell Stamper; Published by the Population Council, New York, 1977, pp. 265+xii.

As the title indicates the book is a review of development plans and their treatment of population problems and policies. The scope of the work is broad—sixty development plans of 1970's of the Third World countries are included in it (the People's Republic of China is the only major exception and it could not be included due to lack of reliable data).

The author has examined the plans of the Third World countries in three aspects, (i) use of demographic data (ii) recognition of population problems and (iii) proposals for population policies. Part I of the book presents findings of its analysis, Part II is drawn upon from the plan profiles including demographic data and relevant sectors from the plans concerning population problems and policies.

The major findings of the study are, (i) most countries used very little demographic data in their plans, (ii) most countries were not planning for the consequences of short term population growth, (iii) 38 countries (i.e., 81 per cent of total population of the countries under study) recognised population problems of some kind or another, (iv) only 26 countries under study contained their development plans policies and programmes to reduce fertility.

In case of use of demographic data, it has been observed by the author that the Asian countries are ahead of African, Latin American or the Caribbean countries. In terms of recognition of population problems and policy formulation also, Asian countries are giving more attention to their population problems compared to other regions. In fact one interesting observation of the author is that "the countries that make exclusive use of demographic data tend to recognize more population problems than those that do not". It is very important to know the actual uses of demographic data in plans of developing countries where population growth rate is very high. And the author tried to indicate use of data as far as possible in his book.

The author recognizes that the developing countries are becoming increasingly aware of the population problems. He points out, "twenty two countries recognize no population problems and include no policies in their plans; 12 countries recognize population problems but have no population policies; the remaining both recognize population problems and include population policies in their plans".

Aspects of population problem considered and perceived by the plans are (i) growth of working-age and school-age population (ii) economic growth reduced by population growth (iii) high dependency ratio (iv) high population

density and (v) population pressure on food, agriculture and various social services.

The population policy strategies incorporated in the plans are (i) extension of family planning services and its integration with health services, (ii) family planning acceptor targets, (iii) population and family planning education, (iv) delay of marriage, (v) policies on abortion, (vi) family planning incentive schemes, (vii) improved status for women, (viii) pronatalist policies, and (ix) general socio-economic development.

All these policies aim at reducing fertility either directly or indirectly. The author observes a positive relationship between the dimension of population problems recognized and the number of programmes (policies) suggested in the development plans. However, he noted that many plans 'contain unrealistic assumptions and proposals' and most of these ideas are not implemented because of conflicting economic and political issues. And there is a gap between the plan proposals and their implementation by the authority. However, the author could not evaluate the plans in terms of their implementation and effectiveness, partly because the plans did not make any mention of past achievements and present fulfilment of the commitments.

In some countries it has been observed that the problem is not that of population as such, but of resource development i.e., elimination of poverty through policies covering both economic and non-economic aspects and distributive justice. General economic development significantly influences fertility, mortality, and migration. But the author has not discussed the general socio-economic features of the plans and their potential role in affecting demographic variables. Moreover, an important demographic variable like migration has been totally excluded from the scope of the book.

But by and large this study will be very useful as an indepth review of the treatment of population issues in the development plans of Third World countries. It has gathered information from a number of hard-to-obtain documents and provides a useful reference for all concerned in population studies. The book amply demonstrates the inter-disciplinary character of the problem which is an important step towards understanding the population problem. More work is yet to be done, but Stamper has charted a significant part of the way.

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Shadow Pricing and Wage and Employment Issues in National Economic Planning

by

DEEPAK LAL*

This article shows how the recently refined theory and practice of shadow pricing is relevant in devising appropriate policies for meeting the recent concerns with poverty redressal and employment generation. It also demonstrates how the problems of employment and equity are related in a series of models where public policy is subject to an increasing number of political and structural constraints. It distinguishes between the long-run perspective planning problem in which the employment problem is manifested as the choice of the optimal growth rate for the economy, and short-run policy problems of dealing with various disequilibria and distortions which force the economy inside the constrained feasibility frontier, and for whose amelioration policies based on estimates of various shadow wage rates are shown to be crucial.

I. INTRODUCTION

In recent years there has been growing concern about the problems of employment, poverty and inequality in developing countries. There is a feeling that past growth has not helped in alleviating these problems, and that a preoccupation with raising growth rates may have worsened the position of (those euphemistically described in India as) 'the weaker sections' of the population, in both absolute and relative terms.

It has also been suggested that conventional economic theory is incapable of dealing with these problems, and hence its conventional policy tools are not of much use when solutions to these problems are sought. The primary purpose of this paper is to argue heuristically against this

*This paper was written whilst working as a consultant to the Employment and Rural Development Division of the World Bank. The views expressed are the author's and should not in any way be ascribed to the World Bank. Discussions with Mark Leiserson, and comments from various members of the Bank are gratefully acknowledged, as are those from an anonymous referee, and members of a seminar at the Australian National University.

view, and in particular to show how the recently refined theory and practice of shadow pricing is even more relevant in thinking clearly about these issues of poverty redressal, and employment generation. The problem I want to consider is how best a group of 'planners' concerned with problems of poverty, inequality and employment can logically think through the various policy options open to them, and derive a package of policy measures for the medium term in the form of a national economic plan.¹ What I want to show is that thinking about shadow prices is a good way to think about the delineation of a policy package which meets the current concerns with poverty and employment in development. In this process I would also attempt to demonstrate the ways in which these problems of equity and employment are related.

But I would like to set out by stating clearly what in my view constitutes the essence of the 'employment problem'. This is done in Section II. I then distinguish two sets of issues relating to the 'employment problem' in the context of development planning. The first set relates to the long-run issues of employment and growth to be organised within a perspective planning framework and is discussed in Section III. The other set consists of the problems arising out of short-run disequilibria which are best tackled through a medium term 'operational plan'. This latter set of issues is taken up in Section IV. A brief summary of the issues raised in this paper is given in Section V.

II. WHAT IS THE 'EMPLOYMENT PROBLEM' ?

There has been much debate about what constitutes the 'employment problem' in developing countries. I believe there is some sort of professional consensus amongst economists that employment as such cannot be considered to be a sensible objective, but is rather a means of providing output and incomes. As within an inter-temporal social welfare framework the optimum structure of output and incomes, with given tastes, technology and political constraints, is provided by the solution to the problem of the optimal inter-temporal allocation of resources, the 'employment problem'

¹ I take planning to mean the delineation of a coherent and co-ordinated set of public policies for maximizing feasible social welfare, rather than the mechanical derivation of material balances and quantity targets which have been taken to be synonymous with planning in many countries, in the past.

and policies (in both their 'production' and 'income' aspects)² are ultimately just part of the general problem of allocating resources optimally.

The notion of 'optimality,' however, can be a slippery one, particularly in any practical situation where the nature of the binding structural and political constraints may be a matter of fine judgement and the 'optimality' of any given allocation, given these additional constraints, may therefore be controversial.

Nevertheless, in thinking about the class of issues subsumed in the so-called 'employment problem' it is useful to keep in mind the instrumental nature of employment policy within the solution of the optimal resource allocation problem for the economy. In fact, the 'employment problem' can most generally be said to be one of choosing the optimal time path of consumption for the economy, from amongst the various feasible paths. Secondly, in outlining a general framework within which the specific concerns and analyses related to labour market phenomena could be integrated, it is particularly useful to distinguish between the long-run or perspective planning problem of inter-temporal resource allocation from that relating to what I shall call the problems of short-run disequilibria. I deal with these in turn. This discussion yields a natural framework for integrating wage and employment issues within a general organizing framework of a good medium term Plan for a country.

Such a Plan would ideally attempt to sort out the policy instruments which are within the control of the planners, their 'optimal' assignment and the resulting effects on social welfare both now and in the future—the purpose being to arrive at a set of co-ordinated public policies for the medium term. This would involve indentifying technological, institutional and political constraints on the achievement of growth and distributional objectives and the delineation of strategic policies (in particular investment and public expenditure policies, and those for suitably doctoring the price-mechanism) which would steer the economy towards its 'second-best' optimal growth path. This, of course, is a very difficult task, and very different from the mechanical solution of multi-sector economy-wide

²There is of course Amartya Sen's [16] 'recognition' aspect of employment which though conceptually relevant in categorising some types of 'unemployment' does not seem to me to be of much operational significance, except insofar as it is a determinant of the supply prices of particular types of labour.

models with which much development planning seems to be identified. It requires fine judgement as much as analytical skill, and hence it is not surprising that there are very few instances of good plans. The breakdown of this planning problem into a long-run perspective plan and a linked but more short-term 'operational plan' is then fairly natural.

III. LONG-RUN GROWTH AND EMPLOYMENT

Formally, the perspective planning problem concerns the determination of the optimal growth and employment path for an economy, given an intertemporal social utility function, which is to be maximized subject to resource, technological, behavioural and political constraints. This may appear too academic, but to see its practical relevance consider the following 'story'. To clarify and sort out the issues, we begin with the simplest case, of a dual economy: an economy with two sectors, one with low labour productivity and the other with high labour productivity. Initially the government is assumed to exercise complete control over the economy. The areas of governmental control are thereafter successively more and more circumscribed to show the effects this has on the optimal path of growth and employment.

The country is 'over populated' in the sense that it has reached its land frontier and hence future agricultural growth depends upon more intensive cultivation. Most of its labour force is engaged in the low productivity sector (which could include subsistence agriculture and the urban informal sector) and here average labour incomes are lower than in the high productivity sector (which could include both 'modern' agriculture as well as the industrial 'urban' sector). The projected rates of growth of population and the labour force are 'high' (say about 3% per annum). There is virtually no open unemployment, with those new entrants to the labour force unable to find 'jobs' in the high productivity modern sector being 'absorbed' in the low productivity traditional sector where the dominant mode of production permits both income and work sharing. There are clearly marked income and consumption disparities between the 'modern' and 'traditional' sectors.

We now consider what could be desirable (or 'optimal') growth path for this economy. To answer this, we need a few more details about the 'structural' and political constraints this economy faces. Let us assume that the Platonic Guardians who run this economy are willing to assign cardinal welfare

weights (based say, on a constant elasticity, additively separable social utility function of the Benthamite variety, whose arguments are based on individual utility levels) to the consumption accruing to different groups in this economy. Their aim is to maximize the socially weighted sum of consumption over time. What is the nature of the 'employment problem' this economy may face, and how can it be tackled?

As there is virtually no overt unemployment, the only meaning which can be given to the 'employment problem' is that it concerns the low productivity and incomes (sometimes referred to as the problem of 'underemployment', at others that of 'the working poor') of those in the traditional sector. The government will want to raise these incomes both for redressing poverty, as well as (given its social welfare weighting system) to reduce income disparities between the 'traditional' and 'modern' sectors. How best can it do so?

Planning without Constraints

Abstracting initially from problems about the future, suppose the government wants to reduce the current income differentials in the country to their socially 'optimal' level. The implied transfer of income from rich 'modern' to the 'poor' traditional sector, *ceteris paribus*, will be both poverty redressing and inequality reducing. The government, *ex-hypothesi* being completely unconstrained, can achieve this income equalisation either by (i) transferring income directly from the high income modern sector recipients to the poor traditional sector, or else (ii) it can shift some of the 'capital' from the high productivity modern sector to the low productivity traditional sector, thereby lowering the average labour productivity (and incomes) in the 'modern' sector and raising them in the traditional sector. However, it is obvious that if both policies are feasible, then the second could be inefficient, for it could lead to lower aggregate output, say as a result of transferring 'capital' from the modern sector characterized by a higher fixed output to capital ratio to the traditional sector with a lower fixed output to capital ratio.³ Thus the conflict between output and 'employment' in this case could only arise if the government were politically constrained not to use direct income transfer mechanisms, and if its only

³This implies that the technology in the traditional sector is inferior to that in the 'modern' sector, requiring both more capital and labour to produce the same output. There is a danger that some of the policies of investing in certain sectors—small-scale industry, rural non-farm, etc.—currently part of the standard aid package, may be 'inferior' in this sense.

option in achieving its distributive aims were to use inferior techniques of production. Given the continuing references to a trade-off between output and employment in some professional circles, it is of some importance to stress that it is only by outlining and demonstrating that both these (one political⁴ and the other technological) constraints do in fact apply in the country being considered, that this position can be sustained.

On our assumption of an unconstrained government, however, in this simple case the government could solve the 'current' poverty redressal and distribution problem by direct income transfers. In that sense it would not have any current 'employment problem'.⁵

With population and labour force growth, the existing 'capital' stock (including land), will be more thinly spread over the working population in both the traditional' and 'modern' sectors. Consequently the average labour productivity and consumption per capita in both the sectors will fall, unless the government can provide enough capital to equip new entrants in the two sectors, so that output and consumption per head remain constant in the two sectors and hence in the economy as a whole.

Moreover, if the government can provide this extra capital for the new entrants, and it can distribute the ensuing product as it chooses, then it would be optimal for it to put the incremental capital in the high productivity 'modern' sector, even though this might mean that it provides less incremental employment than if it spread this capital more evenly across the economy. Obviously, the larger the incremental capital stock, and hence incremental employment in the 'modern' sector, the higher will be output and consumption per head and the larger will be the proportion

⁴In a more general model (see below) the political constraint would also have to include the inability of the government to suitably doctor the price mechanism say through the use of wage subsidies.

⁵Moreover, if 'capital' is perfectly mobile between sectors, it would be optimal for the government to transfer capital from the low to the high productivity sector till the marginal product of capital in the two sectors was the same. More realistically, however, 'capital' once installed is likely to be non-shiftable. This is particularly true of 'land' which is likely to be the most important co-operant factor of production within the rural part of the 'traditional' sector. It should also be noted that this does not imply that there will not be a surplus of labour time in this situation, nor that there is no problem of raising productivity and hence the level of 'equal incomes'. But given the limitations of co-operant factors of production this is (as is emphasized below) not an 'employment problem' but, the usual one of a shortage of 'capital' and the ensuing problem of generating an adequate overall growth of GNP.

of the new entrants to the labour force absorbed in the high productivity modern sector. Beyond a certain level of the incremental capital stock, all the new entrants to the labour force would have been absorbed in the high productivity sector and further expansion of the modern sector (by increasing its capital stock) would obviously imply a shift of existing workers from the low to the high productivity sector. Thus alternative levels of incremental capital will imply alternative increases in future output and consumption per head, and alternative rates at which the labour force (existing and incremental) in the traditional sector can be absorbed by the high productivity 'modern' sector. The rate of capital formation, the rate of growth of output and consumption per head, and the rate of transfer of the labour force from the traditional to the modern sector, are clearly directly related.

The only sources of capital are obviously savings out of current output or else through foreign aid or investment. To make the completely unconstrained case as stark as possible, assume that some benevolent aid agency is willing to give the government enough capital, once for all, to enable it to transfer the whole of the existing (and incremental) labour force in the traditional sector to the 'modern' sector, the resulting level of the capital per worker and output/head being sufficient to generate adequate savings to equip future new entrants to the labour force with sufficient capital to keep the high productivity sector's capital per worker constant forever. Clearly, in this case there will be no 'employment problem' of any sort for the economy to face.⁶

Planning under Political and Structural Constraints

However, no fairy godfather exists to provide any country with capital bequests which enable it to provide both its current and future population with enough capital to enable the whole labour force to be 'employed' in the 'modern' high productivity sector instantaneously. This means that the current and future capital/labour ratio and hence (equally distributed) output per head will depend upon the amount of current and future

⁶Strictly the above argument should be couched in terms of the capital/labour ratio which is required on the golden-rule path which is the maximal consumption per head steady state growth path, for any given rate of population growth and Harrod-neutral technical progress. As is well known, the golden-rule capital/labour ratio is obtained by equating the marginal product of capital to the natural rate of growth (which in turn is the sum of the rate of population growth and labour augmenting technical progress).

savings the government is willing or able to squeeze out of current and future output. This immediately forces the government to examine the familiar and well-known trade-off between 'employment and growth'.

Continuing with our 'story', the government is now 'constrained' by the need to generate enough domestic savings to raise the aggregate capital to labour and output per head ratios of the economy. It can only do so by cutting (*ex-hypothesi*) equally distributed consumption. Suppose, it chooses not to do so beyond the level which is enough to maintain the current capital stock in both sectors intact. In that case, current workers will enjoy the maximum level of consumption that is feasible, given the country's resources and technology, without actually running down the existing capital stock, (and given the initial allocation of non-shiftable 'capital' between the two sectors). However, this will mean that with population and labour force growth, even in this otherwise unconstrained case, the capital per worker in the two sectors and hence output and consumption per head in future will be lower than that of the current population. As a result, even though everyone in the future has the same income (given our "perfect intratemporal distributional control" assumption), and *ex-hypothesi* no one is overtly unemployed, there is in a sense an 'employment problem', viz., a trade-off between the levels of current and future per capita consumption. Some of the mechanical manpower projection models capture this aspect of the problem by simulating the labour slack which would exist if the labour capital ratio was fixed for the economy. Within such a framework, and with no growth in the capital stock, the new entrants to the labour force would clearly, in this case, be redundant.

Obviously, the greater the savings flowing from the reduction of current (equalised) living standards that the government can squeeze out, the higher the capital and output per head it can achieve in the future. The optimal level of savings will, therefore, depend upon the relative weight the government attaches to the consumption of current and future generations. Given the initial conditions, the exogenously determined rate of growth of population and its intertemporal social valuation function, a simple optimal growth model can be set up, which would yield the welfare maximising optimal path of consumption per head and savings, till all the labour force has a productivity level corresponding to that in the current high productivity 'modern' sector. Thus, at the time the economy as a whole has achieved productivity (and income) levels of the current 'modern' sector, there will in a sense be no 'employment problem' of any kind. Clearly one question that can be usefully asked is how long it would take (T) for a

country constrained only by its initial conditions, population growth rate, current and future technology, and some lower subsistence income bound on the consumption per head, to attain current levels of modern sector-productivity, in all the sectors in the economy, assuming some plausible range for the parameters of the social utility function. (If this is of the constant elasticity type, this parametric variation would consist of estimating T for alternative values of $e=1, 2, 3$.) Some rough and ready estimates of T , would provide a useful indication of how long on the most optimistic assumptions, it would take a country, relying on its own resources and following optimal policies, to eliminate the employment problem in every sense.⁷

No government, however, benevolent or powerful, is likely to be merely constrained by the initial conditions and the given rate of growth of population. In particular the assumption that the government can legislate whatever income distribution it chooses at a point in time, as well as what it considers to be the optimal savings rate (or intergenerational income distribution) is clearly unrealistic. The ensuing constraints are best viewed as political constraints and their implications for the optimal development of so-called labour-surplus economies have been extensively studied in the development literature⁸. Here country specific information about the nature of the constraints will be important in delineating the appropriate long-run development 'optimal growth' path for the economy. It may be useful in clarifying the underlying ideas, and their relationship to the 'employment problem', to briefly outline, the commonest form of such a politically constrained optimal growth model.

We now assume that the government cannot directly transfer income to the 'poor' because of the lack of any feasible transfer mechanism. Secondly, the only instrument available to it to raise the income of the poor is to employ them in the high productivity 'modern' sector. However, thirdly, either the supply price of workers to the modern sector is greater than the value of their alternative marginal product in the traditional sector, or else there is an institutionally fixed wage in the urban sector which is above the supply price (which is equal to the marginal product) of workers from the traditional sector. Assessing the validity of these assumptions and their quantitative significance, should obviously be

⁷ T corresponds to the date (in the project evaluation literature) when the shadow price of investment in terms of consumption becomes unity.

⁸See [1 ; 2 ; 3 ; 4 ; 10 ; 11 ; 13 ; 14 ; 17].

an important part of any attempt to deal with wage and employment issues in economic planning for a country where this type of model may seem applicable.

Suppose they do hold. Then it is well-known that the government faces a further dilemma, that its attempt to improve the conditions of the poor today, by increasing modern sector employment, directly entails increased current aggregate consumption, which is at the expense of future growth and employment. The government now has to weigh the impact of any attempts to increase industrial employment, on both the current distribution of consumption, as well as on the intergenerational distribution. Clearly, given its social valuation function, on this politically constrained optimal growth path, these weights on intra-and inter-temporal distribution must be consistent. Again an optimal growth model for such a two-sector economy can be set up and numerically solved for alternative parameter values of the social utility function, etc., to yield the time T' by when the employment problem in all its manifestations would be eliminated by following 'second best' optimal policies given the political constraints. From the same model (which can be approximate, as it is really only important to get some rough idea of the magnitudes involved), estimates of 'national parameters' which are required for investment appraisal, such as the accounting rate of interest, and the 'industrial' shadow wage rate can be derived. Apart from their use in investment appraisal, these estimates of national parameters would be useful in analysing various prices and public expenditure policies which have a distributive impact. Also the important current critical consumption level at which income transfers are as equally valuable socially as the numeraire for social accounting (say, public savings), and on which the current distributional weighting system depends, would be determined.

Given the recent emphasis on programmes for various poverty groups, the derivation of the critical consumption level is of some importance in assessing these programmes. For this level will not in general be identical with some national poverty line. The reason for this can be seen in terms of our above arguments on 'employment and growth'. For as its name suggests the critical consumption level is that consumption level at which consumption transfers are socially as valuable as savings, with transfers to those below (above) it being even more (less) socially valuable. If a large part of the population is below some national poverty line, and the critical consumption level is identified with it, then this will imply that increasing the current consumption of a majority of the

population is socially more valuable than savings and growth. Given our earlier argument, however, it is unlikely that in such countries future consumption (and growth) can be discounted so heavily, and hence the critical consumption level will most likely be less than the poverty line.⁹ The resulting judgements on the socially desirable level and coverage of poverty programmes will therefore differ, with differing judgements about the critical consumption level.

For the framework of national planning, moreover, estimates of T and T' would provide some meaningful measure of the seriousness of the employment problem even if otherwise optimal policies are followed. The discussion of required capital inflows could also then be sensibly related to the question of the impact of alternative feasible levels of such inflows in shortening T' .

Various other public expenditure decisions, could also be thought through in this framework. For instance, if some forms of direct income or consumption transfers (for instance, through nutrition programmes) to the poor are considered to be feasible, either their 'optimal' level (given assumptions about the politically constrained size of the government budget) or else, the effects of any given level of such transfers on T' could be estimated.

The end result of adopting some such perspective planning framework which integrates the growth and employment aspects of long-run development in a consistent welfare economics framework would provide both some quantitative feel for the feasible limits of current and future poverty redressal, as well as the trade-offs between them, given judgements about existing and likely future political and structural constraints.

IV. SHORT-RUN DISEQUILIBRIA, LABOUR MARKET STRUCTURE AND THE REAL COST OF LABOUR

The above discussion of the perspective planning problem assumed that the economy would otherwise be operating optimally given the absolutely binding political and structural constraints. In practice this assumption is unlikely to be valid. There are likely to be various distortions,¹⁰ some of which may be policy induced, which will prevent the economy from

⁹For actual numerical experiments for India see [9].

¹⁰The term 'distortions' is a useful short-hand expression to describe a host of considerations which cause divergences between the marginal social costs (MSC's) and marginal social values (MSV's) of different goods and services in the economy. For an economy at its optimum $MSC=MSV$ for all goods and services.

doing as well as it could, even given the binding political and structural constraints. That is, the economy may be inside its feasible second best production possibility set. A heuristic discussion of this point is contained in the Appendix.

Much of the actual art of planning consists of delineating the reasons why a particular economy is not on its 'second best' feasibility set and outlining policy measures which may put it on this feasible frontier. Such policy changes could lead to both greater current employment (consumption) and growth (investment). These class of issues can be contrasted with those which essentially concern choosing the optimum point on the constrained production possibility set and hence involve, in its simplest form, the trade-off between current employment and growth.

In addition, it will be important to assess and analyse the structure of labour markets in the countries concerned. There are two ways in which analyses of labour market structure could be both improved and integrated into an overall Plan framework.

The first stems from the obvious inter-relationship between the specific labour market structure of any country and the structural specification of a simple (say, two-sector) optimal growth model which allows social choices relating to growth, employment and distribution to be integrated within a consistent inter-temporal perspective planning framework. Thus for instance, in the simplest of these models, those concerned with a labour surplus dual economy, it will be important to know the reasons why there is an inter-sectoral 'wage' (income) differential between the modern and traditional sectors, its size in real terms, and how depending upon both individual or household behaviour in the two sectors as well as their respective production relationships, this differential is likely to evolve over time.

But, this in turn will require some knowledge and analysis of the modern and traditional sector labour markets (including their more important sub-markets) and their inter-relationships. The analysis of these labour markets, is best done in an explicit demand and supply framework. However, in determining the supply of labour markets, it is not sufficient to look at the stock of labour time available from the labour force specifically assigned to that sector on the basis of past labour force surveys, as seems to be the usual practice. It is equally important to assess the likely spillover effects of any change in labour demand conditions in the particular market, on other linked markets. In many economies it may also be particularly important to disaggregate labour supply, spatially, and to take into account the resulting migration flows between different

geographical markets. A rough and ready estimate of the resulting elasticity of labour supply with respect to the wage rate in the major labour markets would thus be an important magnitude, as it would enable some rough quantitative estimate to be made of the likely distributional effects of increasing labour demand in particular sectors. Ideally, estimates of 'short' and 'long' run elasticities should be differentiated. But even some qualitative judgement of the difference between them would be useful.

In the analysis of these labour markets, outlining institutional and structural features, such as differing modes of production in different sectors, will be extremely important. For instance, in rural (particularly agricultural) labour markets the distribution of land and the land tenure system, together with the cropping pattern, and the relative importance of hired as compared with own family labour in different farm operations would be important determinants of the supply price of labour both within and (through migration) to other sectors in the economy. Some rough and ready estimates or at least qualitative judgements of these supply curves of rural labour are again necessary if the distributional impact of increased demand (direct or indirect) for rural labour via the resulting changes in real wages, is to be determined.

In some countries the wage-determination process might be dominated by administered wages in some parts of the 'modern' sector. It may be impossible to expect that this 'structural' feature could be removed, in which case it might have to be accepted as yet another 'political' constraint. Similarly, the role of 'minimum' wages on the supply and demand for labour may be important, and will need to be assessed. Thus the implications for the supply of labour and relative (as well as absolute) wage movements resulting from changing labour demand in alternative sectors will have to be thought through, and again if data availabilities permit, quantified.

The upshot of this is that after delineating the more important labour markets in the economy, their inter-relationships and the existing structure of relative real wages in the economy, it is important to form some judgement on the wage (income) determination process in the various labour markets, which in turn involves forming judgements on the relevant supply and demand curves of labour in the various labour markets.

It is particularly important to concentrate on the relevant supply curves of labour in different labour markets partly because of the relative neglect of this aspect in most national plans (which at best tend to adopt a mechanical 'stock' of labour time definition of labour supply),

and also because in an important sense whereas the demand for labour (either in aggregate or in different sectors) is within the government's control through its investment and public expenditure policies, the supply of labour (except in slave economies) is not within its control. As the distributive ('employment') effects of alternative labour demand increasing (via investment) policies will depend upon the interaction of the incremental demand and supply of labour, it is extremely important to know at least the shape of the supply curves of labour in the different sectors (or sub-sectors). Having said this, the actual analysis of labour markets and the determinants of the labour supply and demand curves in different economies will involve country specific information, fine judgement, and imagination. Clearly it would be impossible and undesirable to lay down a specific checklist or guidelines for such labour market analysis for the varied countries classified as developing.

However, there is one organizing framework within which the aspects of the labour market, particularly those relating to the supply curves of labour, can be integrated, and which if followed consistently across countries would force the country economists concerned to think through and quantify some of the aspects of labour markets which are relevant for policy purposes. This is the shadow wage rate framework of project analysis. It is relevant and useful as a framework for organizing the labour market discussions in national planning for two important reasons.

First, as we have emphasized, the important structural features of a particular country's labour markets, for which some feeling is required in thinking about the long run growth and employment prospects of a particular country, relates to the supply side of the labour market and the process of wage determination. Secondly, in the most general sense, the employment problem both in its resource utilization and distributional aspects, is a problem of differential real costs of labour in different sectors, which moreover do not equal the relevant market wages in all the sectors. The real cost of labour consists of the sum of the social cost of the output foregone by shifting a marginal unit of labour from one occupation to the next plus the net social cost of the consumption changes flowing from any such shift of labour, and which takes account of the effects of these consumption changes on both inter and intra-temporal income distribution. The shadow wage rate (SWR) is nothing else but this real cost of labour. Estimates of relative SWR's for different sectors or in particular labour markets, therefore provide an important indication of areas where specific investment are likely to

make the greatest impact on growth and distribution. As apart from measures which improve the overall efficiency of the economy (on which more below) and which thus enable it to operate on (or close to) its structurally and politically constrained production feasibility frontier, the other major policy instrument available to a government is its deployment of investment and public expenditure in the economy. For determining this 'optimal' investment programme which takes account systematically of both growth and distributional (employment) objectives, subject to given structural and political constraints, some notion of relative social rates of return in different sectors is required, and to form judgements on these some idea of the relative SWR's in the sectors is necessary.

It seems to me that an important way to organize the discussion of the structure and functioning of labour markets in national planning is thus within the framework of SWR estimation. This would require estimates of real sectoral income (wage) differentials, and sectoral real consumption levels, plus the sources and supply prices of labour drawn from within and from inter-related sectors as a result of an increase in the demand for labour in the particular sector.

It may be useful to see the specific aspects of labour markets which such a framework would require to be analysed in national planning. Confining ourselves to two sectors, but using an argument which can be generalized to many sectors, consider an economy depicted by Figure 1.¹¹ It has two sectors labelled I and II, and for simplicity we (initially) ignore the possibility of unemployment in the two sectors, and also assume that the wage rate is the same (W) in both the sectors (neither of the two assumptions is essential to the argument but simplifies the exposition). The demand curves for labour in the two sectors are D_I and D_{II} , and the initial labour allocation between the two sectors is EL_I in sector I and EL_{II} in sector II, with the common wage W . Suppose the effective supply curve of labour from sector II to sector I is greater than the wage (equal to the marginal product) in Sector I, because of various imperfections like those in information flows, various psychic disutilities and real resource costs of moving from one sector to another. If sector II is rural and I is urban, then the difference between the supply price and marginal product of rural labour will also depend upon various institutional features such as the relative proportions of landless and landed peasants, the extent of pure family labour operated

¹¹ This is due to Scott [15].

farms, the land tenure system etc. The resulting supply curve of sector II labour to sector I is then given by S_{II}^2 in Figure 1. Suppose that there is an increase in demand for labour in sector I of $E_I E_{II}$. This will raise the wage-rates in both the sectors. In the new equilibrium the sector I wage will have risen to WW' ; at this wage given the S_{II} supply curve of labour, EE_{II} workers will move from sector II to sector I, and the wage in sector II will rise to WW'' (and there will now be a wage differential between the two sectors). The increased demand of $E_I E_{II}$ of labour in sector I will thus be met from a transfer of EE_{II} from sector I who are 'obtained' by the bidding up of sector I wages. These proportions and the accompanying changes in sectoral wages obviously depend upon the initial allocation of the labour force between the two sectors, the elasticities of labour demand in the two sectors, and on the elasticity of labour supply from sector II and I.¹² Thus to assess the consumption and output changes which result from increasing labour demand in sector I, which are required for SWR estimation, we need some rough estimates of these elasticities. This argument can be extended to cover a number of sectors, one of which could be a 'sector' of open unemployment, and could also include sectors where wages are administered ('institutionally given'). For estimating particular sectoral SWR's it would be necessary to estimate the proportions in which labour would be drawn from various other sectors if labour demand in a given sector were increased, and this (as the above simple model shows) would entail an analysis of the major labour market issues—wage structure, changes in 'unemployment', migration etc.—that would be of interest in deriving employment oriented Plans.

Incorporating Other Labour Market Issues within the Proposed Framework

Are there aspects of the recent concern with poverty and employment in Plans impinging on labour market phenomena, which the above framework would not be able to include?

Prima facie, there are two types of discussion which are common to many national Plans, which we have not mentioned explicitly, and which might be thought have been excluded from our discussion. One is the measurement and interpretation of rates and levels of unemployment, the

¹²The ratio $E_I E_{II} / E_I E = \frac{E_I E \times WW'}{WW \ E_{II} E} = \frac{\text{Slope of } D_I}{\text{Slope of } S_{II}}$

$$= \frac{E_{I, e}}{1} \times \frac{W}{E_{II} \times e_{sII}}$$

$$= E_{I, e_{dl}} / E_{II, e_{sII}}$$

(assuming that D_I and S_{II} are straight lines and where the e 's are elasticities of demand and supply).

other is the discussion of the appropriate development of different skill levels through the educational system. We deal with these in turn.

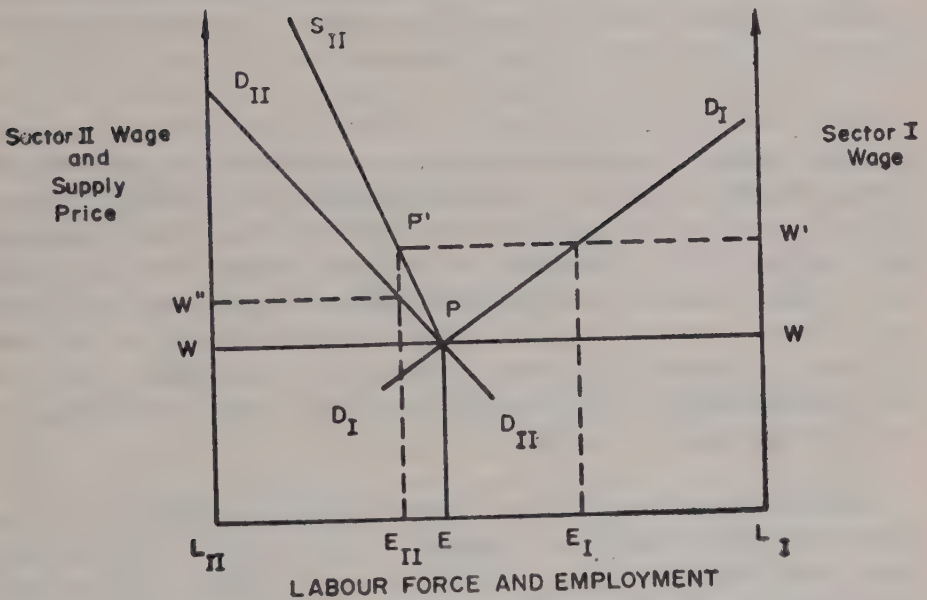


Figure 1

Unemployment—Measurement and Interpretation

Most national Plans increasingly present some measures of 'unemployment', but the concept of 'unemployment' seems to vary from measures of open unemployment; to those of 'underemployment', to those of the poor (classified on the basis of some minimum nutritional standards). Raj Krishna

[6] has recently tried to relate the varied unemployment measures which are most commonly derived (or are derivable) in developing countries, in terms of varying intersections of three general sets of 'people': those who are idle, those who are willing to work more, and those who are poor. Thus the openly unemployed are idle and willing, but not necessarily poor; the underemployed are usually poor and willing but not necessarily idle, whilst the poor may be neither idle nor willing (or able) to work more. There is something to be said for adopting this common framework for measures of unemployment, for it would at least entail that the particular numbers generated would have a clear and unambiguous meaning and could be meaningfully compared across countries.

More importantly, the distinction between the idle, willing and poor, helps to integrate the alternative measures of unemployment into the proposed analytical framework for national planning. A delineation of relative income (wage) levels in various sectors of the economy, which is required both within the SWR framework, as well as to provide some of the structural stylized facts for thinking about alternative long-run development paths for the economy, would obviously also provide an index of 'the poor'. But more importantly, this index would now be meaningfully integrated into a framework from which both long-run and short to medium term policy decisions could be derived.

Similarly the estimates of the underemployed—the willing and poor (the working poor)—too would be integrated in the type of 'dual' economy type labour market analysis of the long-run development of the economy. The implications of such an economic structure for both alleviating poverty and removing these dualistic features over time for alternative long-run development paths, as well as the relevant policy package in the near future which takes account of both growth and distribution, would need to be explicitly faced within the proposed organizing framework for national economic planning.

This leaves the interpretation and integration of measures of open unemployment within our organizing framework. The proposed SWR framework, within which open unemployment is treated as a 'separate sector', would necessitate an analysis of the causes of open unemployment, how it is financed, the characteristics of the unemployment—in particular of their supply prices, and most importantly of the effects of alternative levels and mixes of increased labour demand on the 'size' of this sector. This would

be a considerable advance, in my view, over the current treatment of open unemployment, in countries where it poses a serious problem.

Education

The treatment of educational issues relating to labour markets are unfortunately rather mechanistic in most national economic Plans. The basic analytical approach which commonly underlies this treatment is a manpower forecasting type approach, and is particularly evident in a common prescription for expanding non-formal education. However, there are serious objections to this type of approach,¹³ which implicitly assumes that there are particular required characteristics for every job or occupation which can be imparted (as in particular machines) to individuals by the educational system, and that there are 'imbalances' in particular labour markets when the supply of people with particular educational characteristics does not match the given demand for them. This mechanistic approach which does not take account of or explain the adjustment mechanism whereby such 'imbalances' would be 'cured' by changes in the relative wage-structure, then ends up by trying to attain 'equilibrium' by regulating the supply via different patterns of educational expenditure.

A more useful framework for thinking about educational policy would be in terms of the relative private and social rates of return (to different levels of education) and divergences between them. Moreover an analysis in terms of relative private and social rates of return would fit naturally within our proposed framework. These rates of return should depend upon explicit labour market variables and judgements about relative current and future demand and supply in markets for different types of skills, and the resultant effects on relative wages. Also analyses of the sources of divergence between private and social rates of return and of social returns for different types of educational attainment would enable appropriate educational policies to be designed for the 'optimum' pattern of educational expenditure. This would, in my view, be more useful than the prescriptions normally derived from mechanistic manpower projection models.

V. SUMMARY AND CONCLUSIONS

There is essentially a three-stage process which underlies the proposed analytical framework for integrating growth, employment and distributional issues in national economic planning. Heuristically, the first stage can be said to consist of delineating the technological possibility frontier between

¹³See [5, pp. 320-321].

present and future consumption (given optimal policies, and no other constraints apart from those of technology, initial resources and given demographic trends). Even then, there is likely to be a conflict between growth (which will determine future consumption) and current employment (which will be determined by the choice of the current level of consumption).¹⁴ The optimal consumption and employment path on this technological possibility frontier may be worth assessing either in terms of fairly simply numerical optimal growth models,¹⁵ or at least in terms of some qualitative judgements about the time it would take for the whole of the working population to achieve average productivity (and income) levels in the current high productivity 'modern' sector if these ideal conditions existed. This would at least provide some sort of upper bound to one's optimism about how soon 'poverty can be eliminated'.

Clearly however, no economy operates on its technological possibility frontier. There are numerous other constraints of a structural and/or political kind, which entail a 'second-best' feasibility frontier, which is the relevant one for any policy purpose. Delineating this feasibility frontier is in part dependent upon judgements about the binding structural and political constraints the economy faces. Some of these constraints may be policy induced, but if for whatever reason there is no likelihood of the government's altering these particular policies, they may have to be accepted as binding constraints. The real art of good economic planning would presumably lie in forming these rather difficult judgements about what in fact are binding feasibility constraints, and hence which of the seeming feasibility constraints can in fact be shifted by persuasion and policies.

If some idea of this feasibility frontier is available, then again a 'second-best' optimal growth path can be calculated, though clearly if a formal optimal growth model is to be solved numerically, it may only be feasible to incorporate the most important of these constraints into say a two-sector model. The feasibility constraints most often incorporated in such models are a 'modern sector' institutional wage above the supply price or marginal product of labour in the traditional sector, and the inability of the government to control the consumption out of wages. Other constraints

¹⁴For even in this case the problem of employment (distribution) and investment (growth) will be inter-related if the labour force is greater than can be employed (with existing resources and technology) till the point where the marginal product of labour is equal to the subsistence wage rate,

¹⁵See [10:14] for some such models and [13] for a lucid discussion of the use of optimal growth models in perspective planning and their link to the concerns of project evaluation.

may be more important in other economies, but it is useful to think through their implications either within a formal numerical optimal growth framework, or else in a more heuristic framework (see for instance [12, chapters 13 and 14] for the date by when there is likely to be no employment problem (savings and consumption are equally valuable), and the resulting weights which should be attached to growth and employment (investment and consumption) over time on alternative assumptions about the elasticity of social marginal utility. These estimates of national parameters are also required for project analysis, which hopefully will increasingly form the basis for making public sector investment decisions in most developing countries.

More importantly however, this approximate delineation of the feasibility constraints should enable the two tasks under the third stage of the process to be completed. The first of these arises from examining to what extent the economy is operating within its feasibility frontier, due to the existence of various 'distortions' which are not part of the feasibility constraints and which could and hence should be corrected. Various policies for correcting these distortions would yield both more growth and employment, and put the economy on its feasibility frontier where alone the trade-off between the two 'objectives' needs to be faced. Much of the discussion in national Plans of tariff, exchange rate and price policies, which enable an economy functioning inefficiently within its feasibility frontier to function more efficiently and move towards this frontier, would clearly fall into place in this context.

The second task, which covers the remaining area of policy formulation in a national Plan, is essentially to determine the 'second-best' 'optimal' investment and public-expenditure programme of the government. This generally involves some assessment, qualitative or quantitative, of relative sectoral social rates of return. In forming these judgements some notion (implicit or explicit) of the sectoral real costs of labour (in other words of the SWR's) is indispensable. To obtain some idea of sectoral SWR's, some judgements on the supply curves (and labour demand elasticities) for the relevant type of labour is required. This in turn requires the analysis of the major labour markets, their inter-relationships, wage determination processes and the structure of income and consumption levels.

Finally, it should be emphasized that this framework is essentially a way of thinking about particular policy issues, and does not entail that for every country mechanical numerical multi-sector models be set up and solved. However, clearly, some quantification of what are considered to be the crucial and relevant relationships would be indispensable.

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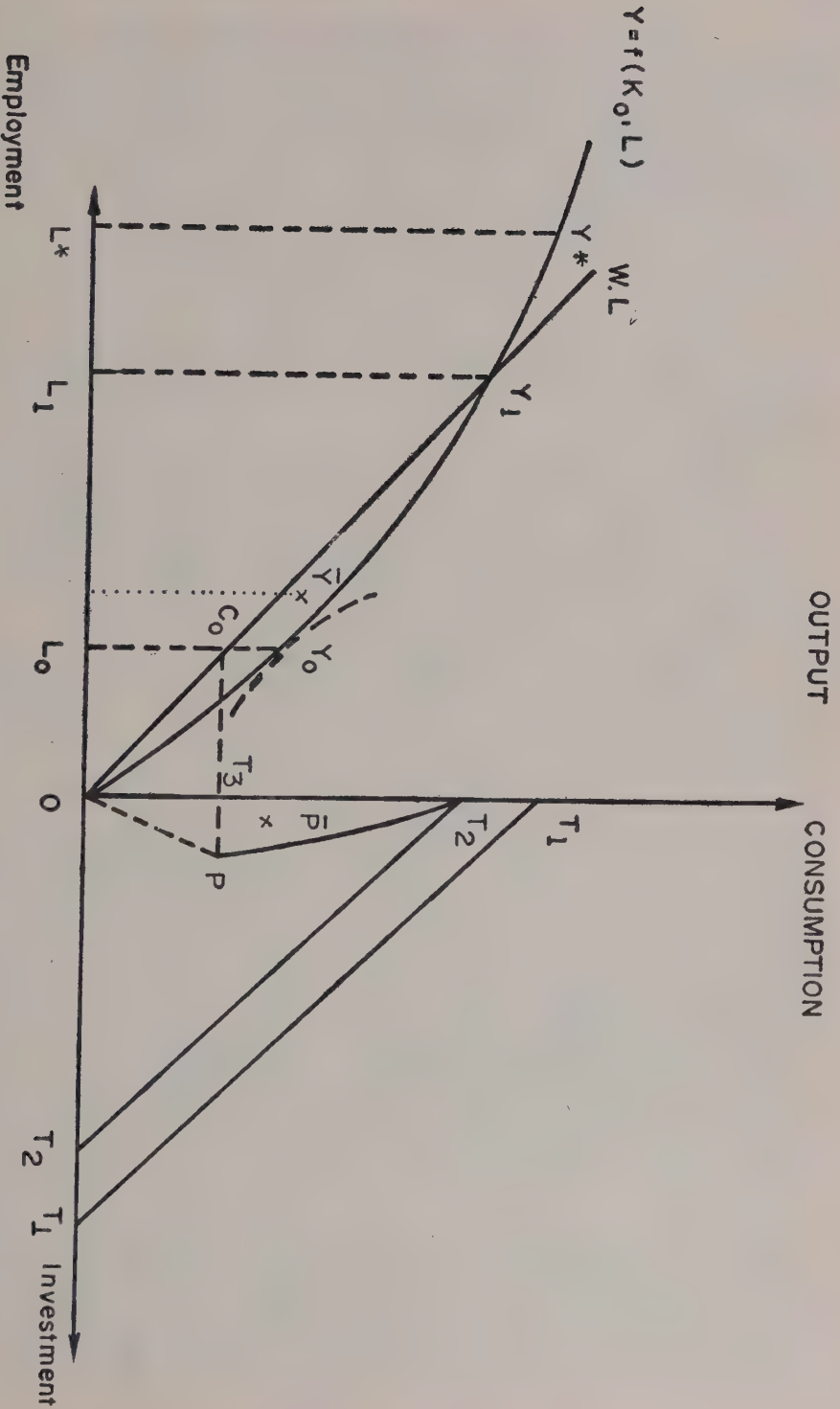


Figure. 2

Note: The above diagram (from [13]) illustrates the relationship between growth and employment and the importance of distinguishing between 'possibility' and 'feasibility' frontiers—where the latter include various 'political' or 'structural' constraints. For simplicity we look at an one-good economy with a given initial capital stock (K_0), and labour force OL^* . In the left hand quadrant of Figure 1, OY is the resulting neo-classical production function which shows current output as dependent only on the labour utilized (given the fixed current capital stock K). If the government has complete control over the economy, and can legislate both the wage-rate and the investment-consumption mix for the economy, then it should clearly maximize current output and employment (given by Y^* and L^* respectively). If the labour force (L^*) is smaller than the level at which the marginal product of labour (with given K_0) falls to zero, this optimal policy will also yield full employment. Moreover the resulting frontier between current consumption and investment can be depicted by T_1T_1 in the right hand quadrant of Figure 1. Clearly, the slope of T_1T_1 will be -1 .

Next, suppose the government, whilst still being able to choose whatever consumption-savings balance it wishes, is nevertheless constrained to pay a fixed wage of W for labour. The maximum amount of employment (and output) that can then be provided is OL_1 , and the corresponding 'constrained' consumption-investment frontier will be T_2T_2 , but which will still have a slope of -1 (as *ex-hypothesi*, the government can choose whatever consumption-investment mix it desires).

We constrain the situation further, by assuming that in addition to paying a fixed wage-rate, the government cannot directly control the savings-consumption balance in the economy, which is now determined by the share of wages (assumed for simplicity to be all consumed) and profits (assumed to be all saved) in total output. Thus if OL_0 are employed with the current capital stock K_0 , total output is L_0Y_0 , of which C_0L_0 has to be paid in wages and will be consumed, and the remainder Y_0C_0 will be saved and invested ($T_3P=Y_0C_0$). As drawn it can be seen that OL_0 will yield the maximum level of investment that is attainable, and P will represent the corresponding consumption-investment mix in the economy. As employment is increased, the feasibility frontier between consumption and investment will be of the T_2P shape (which will lie within T_2T_2). The efficient feasibility frontier (between consumption and investment) for the economy subject to the above two constraints will thus be T_2P (it will not be efficient to be on the OP section of the frontier that is to have employment less than OL_0 as this reduces both consumption and investment). This structural-cum-politically constrained feasibility frontier clearly will lie within the 'unconstrained' feasibility frontier T_1T_1 , and the 'structurally constrained' frontier T_2T_2 . The optimal level of employment and growth will then be determined by the relative social valuation of consumption and investment, which will determine the optimal point on the PT_2 feasibility frontier.

Finally the economy may not be operating efficiently on its constrained feasibility frontier. It may be at a point such as $\bar{\gamma}$ in employment-output space, and the corresponding point \bar{P} , (in consumption-investment space) which is within the feasibility frontier T_2P . Clearly policies which put the economy on this frontier could achieve both more consumption and investment (or employment and output).

Pitfalls in Partial Adoption of the McKinnon-Shaw Development Strategy : The Nepalese Experience

by

MAXWELL J. FRY*

Nepal embarked upon a programme of financial development, including interest rate liberalisation and reform in 1974. The aims were explicitly to increase domestic saving, investment and the efficiency of investment. This paper analyses the effects of the interest rate reform. Short-run effects have included a change in the composition of money, a substantial fall in velocity of circulation and capital inflow from India. The overall effect has been mildly expansionary. However, saving and investment have not responded. Other government policies strongly deter investment. Yet, a buoyant demand for investible funds is a prerequisite for successful interest rate reform. The necessity of simultaneous liberalisation and reform of government taxation, price, foreign trade and finance policies to raise the rate of economic growth is borne out in the case of Nepal.

I. INTRODUCTION

The Nepal Rastra Bank, the central bank of Nepal, launched a programme of financial development in 1974. As part of the programme, nominal institutional interest rates were raised in 1974 and again in 1975. The governor of the Nepal Rastra Bank justified higher interest rates with the analyses presented by McKinnon [7] and Shaw [10]. The objectives were to increase both national saving and the average efficiency of investment [9, pp. 2-5]. Over the period 1968/69-1972/73,¹ Nepal's ratio of gross investment to gross national product (GNP) averaged 10 per cent and her incremental capital/output ratio was 4.6. Real growth in GNP was just over 2 per cent a year over this period. There was, therefore, little question about the desirability of increasing investment and its efficiency.

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¹ The Nepalese year runs from mid-July to mid-July.

McKinnon and Shaw stress the importance of simultaneous liberalisation and reform of exchange rate, trade, fiscal, price and financial policies for greater quantity and quality of investment. However, the Nepal Rastra Bank could not secure government support for a full set of McKinnon-Shaw reforms, and was itself able to implement only the financial components.

This paper analyses the results of Nepal's partial adoption of the McKinnon-Shaw development strategy. The subsequent section sketches the financial component of the McKinnon-Shaw model. Section III describes Nepal's financial development programme, while Section IV examines the effects of the higher interest rate structure. These effects do not include increased volume and efficiency of investment. Therefore, Section V reviews what went wrong and draws some general conclusions from the Nepalese experience.

II. THE MCKINNON-SHAW MODEL

Despite a voluminous literature stressing the importance of financial development in the process of economic growth, a convincing theoretical framework was lacking until the recent publications of McKinnon and Shaw. Indeed, neoclassical growth theories assign, in the main, a negative role to the monetary process. Here, a reduction rather than an increase in real returns on financial wealth stimulates saving and investment. McKinnon and Shaw both take issue with the neoclassical proposition, showing that crucial assumptions in this paradigm are erroneous in the context of less developed countries. McKinnon produces an alternative model in which real money balances are complements rather than substitutes to tangible investment. Shaw rejects neoclassical growth models in favour of the debt-intermediation view which he himself pioneered in the 1950s.

The basic common elements of the McKinnon-Shaw model are shown in Figure 1. Saving, $S(Y_0)$, at income level Y_0 is a function of the real rate of interest. F represents financial repression, taken here to consist simply of an administratively determined nominal institutional interest rate, which holds the real rate below its equilibrium level at r_0 . Actual investment is limited to I_0 , the amount of saving forthcoming at the real interest rate r_0 .

If the ceiling applied only to savers' interest rates, e.g., only to deposit but not to loan rates of interest, the investor/borrower would face an interest

SAVING AND INVESTMENT UNDER
FINANCIAL REPRESSION

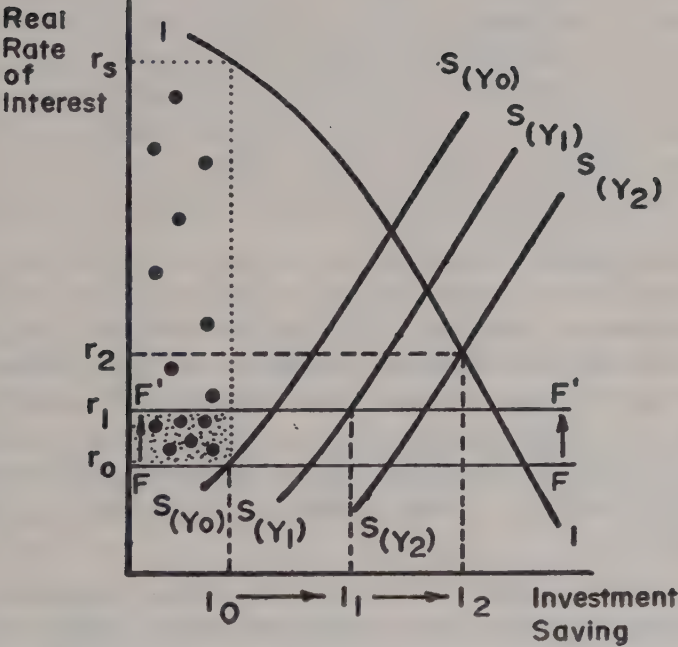


Figure 1

rate of r_3 , the rate which clears the market by equating demand for funds (investment) with the limited supply (saving). Only those investments with expected risk-adjusted returns above r_3 would be carried out. Financial institutions would, of course, vary the actual interest rate charged to borrowers to incorporate appropriate risk premia. The main point, however, is that relatively high yielding investments would be financed.

In practice, ceilings typically apply to loan as well as deposit rates of interest in developing countries. To the extent that financial institutions observe the loan rate ceilings, nonprice rationing of loanable funds must occur. Nonprice rationing criteria may take the form of quality of collateral offered, political pressures, 'name', loan size, and perhaps covert benefits to the responsible loan officers. These criteria can be counted on to discriminate inefficiently between investment opportunities. Indeed, there will be a preference for traditional, often low yielding investments because these are cheapest to administer and least risky. Loan rate ceilings deter risk taking by financial institutions since they prohibit risk premia being charged. This itself rules out a large proportion of potentially high yielding investments. Hence, the investments actually financed when loan rate ceilings are enforced can be represented by the dots in Figure 1.

Raising the interest rate ceiling from FF to $F'F'$, i. e., from r_0 to r_1 , in Figure 1 raises saving and investment. It also rations out all those low yielding investments, illustrated by the dots in the shaded area, which were financed before. They are no longer profitable at the higher interest rate r_1 . Hence, average investment efficiency rises. The level of income increases in this process and shifts the saving function to $S(Y_1)$. Thus, the real rate of interest as the return to savers is the key to a higher level of investment, and as a rationing device to greater efficiency. The impacts on growth are multiplicative.

The policy prescription of this McKinnon-Shaw model is to raise institutional interest rates and/or to reduce the rate of inflation. Abolishing interest rate ceilings altogether produces the optimal result of maximising investment and raising still further investment's average efficiency. This is shown in Figure 1 by the equilibrium at I_2, r_2 , and a higher income level Y_2 .

The McKinnon-Shaw model sketched above rests on the assumption that investment opportunities abound [7, pp. 59-61 ; 10, p. 81]. The binding constraint is supply of saving, not demand for investible funds. Empirical support for this assumption for seven Asian developing countries is presented

in [4 ; 5].² The sample did not include Nepal. Indeed, the applicability of this assumption for Nepal and other least developed countries has already been questioned elsewhere [3]. It is precisely to ensure a buoyant demand for investible funds that McKinnon and Shaw stress the need for appropriate exchange rate, trade, fiscal and price policies. Investment can all too easily be deterred by ineffectual government policy. The non-financial elements of the McKinnon-Shaw development strategy are considered in Section V. Before that, however, Nepal's financial development programme is described and the effects of higher interest rates analysed.

III. NEPAL'S FINANCIAL DEVELOPMENT PROGRAMME

The Nepal Rastra Bank's financial development programme consisted of measures to stimulate saving, to encourage innovative lending by the financial institutions, and to promote efficient investment. The Bank raised nominal institutional interest rates substantially in two stages, the first on 16 July, 1974, the second on 28 April, 1975, as shown in Table I. The first point of note is that both the absolute and the relative gaps between savings and (the 12-month) time deposit rates of interest widened in 1975. The absolute gap increased from 3 to 7 percentage points, the relative gap from 46 to 87½ per cent. Second, the authorities evidently had greater faith in selective credit policies with finely calibrated differential loan rate structure both in 1974 and since 1976 than they had in 1975. Finally, since 14 April 1971 the ordinary commercial loan rate has been specified as a minimum rather than as a maximum or simply as the rate.

In 1974 commercial banks were required to lend at least 5 (later 7) per cent of their total deposits to farmers and small scale enterprises. The response was slow; well under half the required lending had taken place by early 1977. In any case, borrowers in these categories were not always using their loans for intended investment purposes. However, commercial banks in Nepal concern themselves with the collateral offered, not the use to which loans are put. As part of the scheme to increase lending in rural areas, the Nepal Rastra Bank offered to meet some of the initial losses of new branches established in places not possessing a bank branch. This did produce dramatic response with 25 branches established in 1975 and 38 in 1976 from a base of 123 in 1974.

² However, McKinnon's complementarity hypothesis is rejected in favour of Shaw's debt-intermediation view.

TABLE I
INSTITUTIONAL INTEREST RATES, 1974-1977

(Percentages)

Institution and Type of Claim	Before 16 July 1974	16 July 1974	28 April 1975	16 July 1976	12 February 1977
Commercial Banks					
Savings Deposits	5	6½	8	8	8
Time Deposits (6 months)	—	—	10	10	9
Time Deposits (12 months)	7½	9½	15	14	12
Time Deposits (24 months)	7½	9½	16	15	13
Ordinary Commercial Loans (minimum)	13	15	18	18	16
Special Purpose Loans	6½-13	15	18	18	16
Agricultural Development Bank		8-14	15	8-16	8-14
Short Term Loans					
Long Term Loans	8-10	7-10	10-15	8-14	8-14
Nepal Industrial Development Corporation	5-9	3½-6½			
Long Term Loans	4½-7½	3-9	10-16	11-16	11-16
Government					
Treasury Bills	4	4	4	4	4
Development Bonds	8½ (10 yrs)	8½ (10 yrs)	10 (5 yrs)	10 (5 yrs)	10 (5 yrs)

Source : Nepal Rastra Bank Quarterly Economic Bulletins, various issues.

Five new financial institutions were established as part of the financial development programme.³ In 1974, the Credit Guarantee Corporation was set up to guarantee upto 80 per cent of agricultural and industrial loans, 70 per cent of service sector loans, and 60 per cent of certain other loans. In 1975 the Agricultural Projects Services Centre and the Industrial Services Centre were founded to conduct project identification, feasibility and appraisal studies for all the financial institutions. Their services are also available to potential investors in both public and private sectors. Project appraisal expertise has been acquired and developed by these centres.

The Securities Marketing Centre—a stock exchange—was opened in 1976. The main aim was to enable the Nepal Industrial Development Corporation to sell its equity holdings of enterprises which it had promoted, once these firms were seen to be operating successfully. Also in 1976 the *Sajha* (cooperative) system was inaugurated. *Sajhas* borrow funds from both the Agricultural Development Bank and the government to relend to members. *Sajhas* charge the same interest rates as other financial institutions, but borrow at 4 per cent below each lending rate.

IV. EFFECTS OF HIGHER INTEREST RATES

The increases in nominal rates of interest in Nepal occurred during a period of accelerating inflation. Real deposit and loan rates rose substantially only after the second round in 1975, as shown in Table II. Real deposit and priority loan rates of interest were both negative in 1974/75, but had risen somewhat from their 1973/74 levels. There were considerable increases in real institutional interest rates in 1975/76, with all rates turning positive for the first time since 1971/72. The real deposit rate fell slightly in 1976/77, the minimum real normal loan rate remained unchanged, while the priority lending rate fell by 6 percentage points to $-\frac{1}{2}$ per cent with the reinstatement of the selective credit policy. Different estimates of expected inflation would alter the real interest rates given in Table II. However, it is reasonably safe to conclude that a sizeable increase in real deposit rates and the minimum real normal loan rate occurred in 1975/76. This increase was sustained in 1976/77.

The first effect of higher interest rates was a shift in the composition of the money stock, defined throughout to include both sight and time deposits (i.e., M2). There was accelerated substitution from currency to deposits

³ The Nepalese financial system prior to 1974 is described in [2].

TABLE II

INFLATION, EXPECTED INFLATION AND REAL INTEREST RATES

1964/65-1976/77

(Percentages)

Date	p	i	i*	d	r	s	d-i*	r-i*	s-i*
1957/58	80.37								
1958/59	89.43	11.27							
1959/60	91.76	2.61		2.50					
1960/61	93.01	1.36		2.50					
1961/62	95.32	2.48		2.50					
1962/63	100.0	4.91	4.23	2.50			-1.73		
1963/64	107.8	7.80	4.31	2.50			-1.81		
1964/65	119.9	11.22	6.36	2.75			-3.61		
1965/66	136.9	14.18	9.04	3.50	7.00		-5.54	-2.40	
1966/67	139.4	1.83	7.59	6.00	11.00		-1.59	-3.41	
1967/68	138.0	-1.00	5.88	6.00	11.00		0.12	5.12	
1968/69	143.6	4.06	5.50	6.00	11.00		0.50	5.50	
1969/70	158.9	10.65	6.03	6.00	11.00		-0.03	4.97	
1970/71	166.7	4.91	4.38	6.38	11.50		2.00	7.12	
1971/72	168.9	1.32	3.95	7.50	13.00	6.50	3.55	9.05	2.55
1972/73	187.9	11.25	6.95	7.50	13.00	6.50	0.55	6.05	-0.45
1973/74	218.4	16.23	9.59	7.50	13.00	6.50	-2.09	3.41	-3.09
1974/75	255.4	16.94	11.17	10.65	15.63	8.27	-0.52	4.46	-2.90
1975/76	261.5	2.39	9.37	15.00	18.00	15.00	5.63	8.63	5.63
1976/77	264.2	1.03	8.50	13.17	17.17	8.00	4.67	8.67	-0.50

Notes :

1) Symbols :

- P Consumer Price Index for Kathmandu
i Inflation
i* Expected Inflation
d Nominal 12 month time deposit rate of interest
r Nominal commercial bank normal lending rate
s Nominal commercial bank priority lending rate
d-i* Real 12 month time deposit of interest
r-i* Real commercial bank normal lending rate
s-i* Real commercial bank priority lending rate

2) Nominal interest rates are weighted averages for each year

3) Expected inflation is calculated from the following weights which were estimated for India using the Almon polynomial technique :

$$t=0.288$$

$$t-2=0.186$$

$$t-4=0.141$$

$$t-1=0.201$$

$$t-3=0.184$$

Source : Nepal Rastra Bank Quarterly Economic Bulletins, various issues.

after the deposit rate increase of 1974. The gap between real yields on currency and 12-month time deposits widened significantly in 1974. The currency/deposit ratio fell by an average annual rate of 4.4 per cent over the period 1957-1974. Between 1974 and 1977, this decline averaged 12.3 per cent, decreasing from 0.91 to 0.61.

The second effect of higher interest rates was an increase in demand for money. The return on deposits increased relative to the return on inflation hedges, i.e., tangible, unproductive assets, so producing substitution into the former from the latter. The savings rate may also have increased with substitution from present to future consumption encouraged by higher real deposit rates of interest.⁴ The gap between real returns on money and inflation hedges was negligible until late in 1975. Then inflation dropped dramatically. The real money stock increased over the subsequent 12 months by 28.2 per cent. This can be compared to an average annual increase of 7.4 per cent over the preceding decade. Another way of looking at the increase in demand for money is to compare the decrease in velocity of circulation $\left(\frac{\text{GDP}}{\text{M2}} \right)$ between 1974/75 and 1975/76 of 10.5 per cent with the average annual decline of 4.9 per cent over the preceding decade.

The third effect of higher real interest rates was a decrease in demand for credit from the private sector. After increasing by an average annual rate of 13.3 per cent over the preceding decade, real domestic credit to the private sector decreased by 2.3 per cent annually from 1974 to 1976. As a result, the banks' reserve/deposit ratio rose from 0.13 in July 1974 to 0.16 in July 1975, despite a massive increase in the public sector's borrowing requirements in 1974/75. The business community and commercial bankers voiced increasing protest against the high interest rates, claiming that these were responsible for a recession in 1975/76 and 1976/77. This criticism led to the lowering of the normal nominal loan rate (as well as deposit rates) of interest in February 1977.

The final effect of higher interest rates was an inflow of Indian rupees. Nepalese deposit rates increased relative to Indian rates, deterring capital flight and inducing capital inflow which was stimulated additionally at this time by the Emergency in India. Net foreign assets increased by an average annual rate of 36.3 per cent over the period 1974/75 to 1976/77.

⁴ Responsiveness of savings rates to real rates of interest has been found in other Asian developing countries [1 ; 4 ; 5].

The fall in the currency/deposit ratio and the inflow of Indian rupees both released expansionary economic forces. (*Ceteris paribus*, the decline in the currency/deposit, cd , ratio increases the money multiplier, m , and the inflow of foreign currency raises the cash base, B . The money supply, M_2 , is, of course, the product of m and B , i. e., $M_2 = mB$.)

The increase in real money demand and decline in demand for credit from the private sector were both contractionary. A rise in demand for money necessarily implies a fall in demand for goods (Walras's law) in an economy where there are no other financial assets.⁵

In fact, the fall in real domestic credit to the private sector was more than offset by an increase in real domestic credit to the government sector of 69.2 per cent a year between 1973/74 and 1976/77. And it was this rapid rise in domestic credit to the government sector that was responsible, in large part, for acceleration in nominal monetary growth to an annual average rate of 19.3 per cent over this period compared to 15.8 per cent during the period 1964/65-1974/75.

The overall stance of monetary policy over the years 1974/75 to 1976/77 appears to have been mildly expansionary. This conclusion is based on a comparison of inflation rates in Nepal and India (with whom Nepal shares a 500 mile open border) and changes in the trade balance between these two countries. Inflation was considerably higher in Nepal, Nepal's imports rose substantially while her exports to India fell. Higher inflation and a worsening trade balance are, of course, the predictable outcomes of a relatively expansionary monetary policy.

Despite this, it has been suggested that the level of economic activity declined in Nepal during this period. In the absence of national income statistics for these years, the evidence is necessarily sketchy. The decline in real private credit has been cited by some as evidence of a recession. In fact, this does not provide any indication about business conditions. It might have been the result of substitution of bank credit for noninstitutional credit or of more economical use of bank credit. The institutionalisation of rice export was also responsible. Prices fell, supply conditions were less erratic, and the Emergency in India produced an inflow of black money to Nepal which could be borrowed by well-connected traders

⁵ *Ceteris paribus*, a decrease in demand for credit lowers the money multiplier because banks' reserve/deposit, rd , ratios rise. The money multiplier can be expressed: $m = \frac{1 + cd}{rd + cd}$.

at interest rates of 12-15 per cent. Imports would hardly have risen so rapidly (doubling between 1973 and 1977) if a recession had set in. The black market legislation, which resulted in sub-optimal stockholding because of the imposition of low, fixed mark-up margins, also reduced demand for credit. Furthermore, there was undoubtedly a substantial increase in unrecorded trade between Nepal and India. Therefore, substitution, economising and nationalisation might be accepted as the more likely explanations of the decline in private sector institutional credit. Nevertheless, arbitrary income tax and import duty assessments, prohibitions against export and movement of certain goods, and price controls clearly did serious damage in selected quarters of the Nepalese economy.

The initial effects of Nepal's interest rate reforms might be listed as follows :

- (a) Increase in the real money stock.
- (b) Rationing out of low yielding, traditional investment activities, e.g., construction, trade and transport.
- (c) Decline in currency/deposit ratio and rise in reserve/deposit ratio.
- (d) Rise in net foreign assets.
- (e) Reduction in some noninstitutional interest rates.⁶
- (f) Reduction in bank profits.
- (g) Increase in the delinquency rate on bank loans.

Noticeable by their absence from this list are saving and investment responses. Had saving and investment risen as a result of the interest rate reform, real domestic credit to the private sector would have risen too. It fell. Such an outcome was predictable—institutional lending rates were at their minimum levels before the reform. Low investment was not therefore the result of a saving constraint, as in the McKinnon-Shaw model. Profitable investment opportunities just did not abound in Nepal.

V. NEPAL'S LOW INVESTMENT

One explanation for Nepal's low quantity and quality of investment lies in the fragmented nature of the Nepalese economy [2, 3]. Non-economic factors such as Nepal's topology and land-locked position,

⁶ Evidence is mixed because of the highly fragmented nature of the noninstitutional credit market. Nevertheless, in rural areas where institutional agricultural lending has been expanding rapidly, noninstitutional interest rates appear to have declined as expected. There is a straightforward analogy here between devaluation and its effect on black market exchange rates and interest rate reform and its impact on noninstitutional rates.

dependence on India, corporatist political system, and ascriptive, traditional society have also been uncondusive to investment. But government intervention has perhaps done most to deter investment and destroy profitable investment opportunities.

McKinnon and Shaw both discuss complementarity between financial reform on the one hand and fiscal and exchange rate reform on the other. All are essential components of their liberal development programme. Only brief attention, however, is paid to the effects of interventionist policies on the investment climate. The emphasis is placed on the adverse effects of fiscal and foreign trade policy on investment efficiency [7, p.30 ; 10, p.126]. In Nepal, however, distortionist exchange rate, trade, fiscal and price policies have been responsible, in large part, for both the low quality and the low quantity of investment.

The Nepalese government has tried to promote investment through a variety of fiscal devices and protective measures. However, Nepal is by no means the only country in which direct investment incentives have had the opposite effects to those anticipated and desired [8; 12; 13]. This paradox is the result of increased uncertainty which government intervention inevitably creates [6]. It was Adam Smith who first stressed the role of certainty in connection with taxation. His second maxim "with regard to taxes in general" is: "The tax which each individual is bound to pay ought to be certain, and not arbitrary" [11, p. 256]. Smith continues: "The certainty of what each individual ought to pay is, in taxation, a matter of so great importance, that a very considerable degree of inequality, it appears, I believe, from the experience of all nations, is not near so great an evil as a very small degree of uncertainty" [11, p. 257]. But arbitrary subsidy and arbitrary taxation have been the hallmarks of Nepalese fiscal policy. Uncertainty is also the common characteristic of other government policies.

In agriculture, for example, numerous investment opportunities have been discovered by the Agricultural Development Bank and the Agricultural Projects Services Centre with returns averaging 30-35 per cent. However, these calculations do not take into account government-produced risk—the arbitrary nature of income tax assessments, capricious changes in excise duties,⁷ price controls imposed with the incompatible objectives of raising prices to farmers but at the same time lowering them to consumers, controls over the movement of goods within as well as from Nepal, etc.

⁷ For example, in 1976 the excise duty on beer was increased so much that demand was reduced by 40 per cent.

The only certainty is that government will intervene to the detriment of the entrepreneur as soon as a profit is realised.

Nepal's import substitution policy has perhaps been most damaging to investment opportunities. Nepal's domestic market is just too small to enable economies of scale to be exploited to the extent needed to raise growth significantly through import substitution. To all intents and purposes India represents the rest of the world as far as the Nepalese foreign trade is concerned. And India's import substitution policy has deliberately depressed agricultural prices relative to manufacturing prices. Nepal has tried to protect her industry against protected, inefficient Indian industry by distorting internal terms of trade even more than India. Nepal's import substitution strategy which resulted *inter alia* in the instances like the creation of one job for Rs. 67,756 in the Hetauda Industrial Park, a rate of return of 2 per cent on capital invested in a sugar factory, a soap factory which had no hope of ever making profits without protection from Indian imports, etc., etc., illustrates the appalling inefficiency of domestic resource allocation in Nepal resulting from government interventionist policies.

Nepal's interest rate reform failed because other government policies effectively destroyed profitable investment opportunities. The interest rate reform alone could not raise saving, investment and growth. In the absence of simultaneous liberalisation and reforms of exchange rate, trade fiscal and price policies, Nepal's financial development programme succeeded only in financing a larger public sector deficit without inflation and encouraging an inflow of Indian rupees.

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Use-Pattern of Oral Contraceptive in Rural Bangladesh : A Case Study of Sulla

by

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AND

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This paper deals with oral contraceptors, their socio-demographic status the reasons as to why they accepted oral contraceptive, and the pattern of use. The data employed were obtained from a multi-sectoral rural project (in Sulla) undertaken by the Bangladesh Rural Advancement Committee. The "single decrement life table approach" has been used to assess the duration and pattern of use among the participants. Cumulative continuation rates for all acceptors were found to be higher in Sulla than other observers have found elsewhere in the country. This is attributed to specific characteristics of the users as well as other programmes being carried out in the area. Classifying contraceptors by reasons for contraceptive use provides results which may be helpful to policy makers.

I. INTRODUCTION

Oral contraception, as a method of controlling fertility, has gradually become important in Bangladesh both within and outside the government programme. The Government services have not yet been able to provide a full mix of contraceptives to the population, although this is a declared policy. That is probably the reason why the pill, which is both non-clinical and more readily available, is recently found to be more popular than other methods to the clients. Its distribution increased more than twenty-fold within only two years of its introduction in 1971 by the Family Planning Programme [12]. Available recent statistics confirm that the same trend continued sharply during the first plan period (except for

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(Contd.)

the year 1976/77) [17, Table 13 1].¹ Programme activities of voluntary organizations in this field also confirm the popularity of pill amongst the clients.

In spite of this, our knowledge about the experience of women who have accepted this method so far is limited. If oral contraception is to be emphasised as a method of limiting births, assessment of its use-pattern in our society is necessary because with the increase in the number of acceptors, the degree of fertility control comes to depend on the effective use of the method. But only a few follow up studies have been done to date to explore the use pattern and factors affecting it. This paper is a modest attempt to fill in this gap by examining the behaviour of oral contraceptors, especially in relation to their socio-demographic status in our society.

This paper consists of five sections: Section II presents a brief review of the literature, and describes the source and nature of data, research methodology and their limitations. Section III examines the characteristics of acceptors and explains the reason behind pill acceptance. Section IV considers the acceptors' continuation and dropout pattern and looks into the reasons for discontinuation. Section V presents some concluding remarks.

II. REVIEW OF LITERATURE, DATA AND METHODOLOGY

Review of Literature

Several factors which may affect the behaviour of pill acceptors have been identified in a number of studies both in the developed and developing societies [4; 5; 8; 9; 10; 11; 12; 13; 14; 15; 19; 20; 21]. Some of the more important factors that have been found to affect continuation rates are religion, age, parity, education, occupation of the heads of households, user's desire for additional sons or daughters and the age of the youngest child.

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¹The reason for low figure in 1976/77 is not known.

It is conceptually feasible to postulate, on the basis of *a priori* reasoning, a number of hypotheses regarding the relationships between continuation rate and the factors mentioned above. But a careful review of the relevant literature warns us against such *a priori* hypothesisation because the studies differ in their findings about correlation between continuation rates and socio-demographic variables. For instance, Frank-Tietze study [8] showed only minor differences in the continuation rates according to age and parity while other studies reveal marked variation with respect to both age and parity, especially to the latter. Westoff-Ryder [21] and Jones and Mauldin [9] showed that younger women (aged less than 30 years) had higher continuation rates than older women in the USA and Bombay. Majumdar [15] and Khan [13] also observed a similar pattern in West Bengal and Bangladesh respectively. But Kanitkar [11] found the highest continuation rates among women aged over 35 for the first six months and so. Westoff-Ryder [21] further observed that women with lower parity had higher continuation rates than women with higher parity, but Kanitkar [11] and Khan [13] found higher continuation rates for this group of women only for the first seven cycles or so.

Both Kanitkar [11] and Westoff-Ryder [21] found that continuation rates were positively related with education. Majumdar [15] and Khan [21 ; 22] also observed the same pattern. But according to Frank-Tietze study [8], women at both ends of educational achievement scale have lower continuation rates than women at an intermediate level of education. Higher continuation rates were also found by Chan in Hong Kong among literates, but he concluded that "women without formal education are not inefficient users of Pills" [5]. Rao's study similarly evidenced very high continuation rates in Sri Lanka among a group of women of whom more than three-fourths were illiterate [19].

The above review shows that the same variable may affect the use-pattern of oral contraceptives differently in different populations. So instead of postulating any *a priori* hypothesis, we shall try to discern in this paper the kind of relationships that exist in our own country between continuation rates and socio-demographic variables.

Data

The data employed in this study relate to a project area in rural Bangladesh, known as Sulla. The Bangladesh Rural Advancement Committee (BRAC), a voluntary organization involved in rural development activities has gradually developed a number of sectoral programmes in this area since January, 1972. This project area comprises parts of both Sunamganj

and Habiganj subdivisions of Sylhet district and includes 220 villages scattered in an area of about 160 sq. miles. The total population of the area is 130,000, the majority (about 70%) of whom are engaged in agriculture [2 ; 3; 7].

The family planning programme of the project began in January 1974. The programme in its first two years covered 71,835 persons, according to the information provided by resident Lady Family Planning Organisers (LFPOs), the grassroot level workers of BRAC. By February 1976, more than 20% of all eligible couples² in the area were using contraceptives and most of them were on the pill [3 ; 7]. In this programme the pill is supplied by LFPOs to the clients at their residence just one day before the termination of the previous cycle. LFPOs, Paramedics and Shayestha Shevikas (nurses) with pre-service and in-service training attend to the case of side effects in addition to their motivational and follow up work. The health programme is supervised by four physicians in the area.

BRAC conducted an "Oral Pill Follow up Survey" from mid-February to mid-March 1976 collecting information of the pill users retrospectively since the date of their pill acceptance. The original sample comprised of all the acceptors (numbering 3,086), but only 77 per cent of them could be actually interviewed. Failures occurred due to multiple reasons, the most common being migration out of the project area [3]. Of all the acceptors, 1.3% refused to be interviewed, and 6% were found to be falsely reported. All the enumerators in the survey were females and received training for one week in the field activities. The data represent a cross section of women in the rural society.

Methodology

As regards research methodology, we have first looked at the percentage distribution of acceptors by the reasons for accepting oral contraception. Thereafter, we have attempted at a more rigorous analysis of data with the help of the "single decrement life table approach" [1, 18] to assess the duration for which use of contraception was continued.

The life table rates for continuation have been constructed for all acceptors as well as for several cohorts of women defined by the time reference of orals acceptance, reasons for acceptance and socio-demographic status. The term 'continuation' is used to denote the fact that a

² Married women, fecund (aged 10-49) and currently living with husbands.

client, on the date of enquiry, was still practising the method that she had previously accepted. The base for assessment of continuation is the total number of acceptors who started using the oral contraceptives [6]. In order to construct the life table rates, several questions were carefully designed to determine when a woman began her first cycle, whether she was still using the pill (on the date of enquiry), when she stopped using it and for what reasons, and what was the total number of cycles of use. For the purpose of this study, we have assumed that a woman who adopted a packet of pills is covered for one woman-cycle. It is further assumed that the loss rate is uniform and those who stop using it at a given period of time are on an average exposed only half of the time to the rate of pregnancy or the other rate of decrements [1].³

Limitation

The life table approach could be more accurate in the case of IUD where by definition the contraceptive method is used continuously from insertion to removal. In the case of oral contraception, the data on continuation is bound to be less reliable for obvious reasons [6]. In order to construct life table continuation rates for contraceptive practice, the following information is needed: (1) date of onset of contraception (2) dropout status of clients (continuing or discontinuing) and (3) date of discontinuation. Such information is likely to be inaccurate in the case of oral contraception and traditional methods.

Since the data were collected from a 'retrospective survey' the problem of loss of information due to follow up failure does not arise. The accuracy of these data may instead suffer from recall lapse [1]. The assumption that a packet of pills supplied to a woman covered one woman-cycle is likely to overestimate the continuation rates if there was any irregularity during the cycle. During the survey period, however, care was specifically taken to minimise these problems with the help of cross-questions. There is also a technical hitch to this method because the use of pills is related to menstrual cycles rather than calendar months [1]. Thus in the process of data analysis, cycles not calendar months were considered as time indicator in order to avoid any bias of overestimation.

The proportion of users with multiple dropout is likely to overestimate the life table rates when the analysis is based on more than one

³See Appendix A for details of life table construction.

segment.⁴ However, the number of multiple users in this analysis was rather too small (37 out of 2,359 users) to inflate the result.⁵ About 98.5% of acceptors had only one continuous segment. A few clients switched over to other methods (30 out of 2,359) during the period of observation and were classified in the terminal status "others".

III. CHARACTERISTICS OF ACCEPTORS AND REASONS FOR PILL ACCEPTANCE

Characteristics of Acceptors

Among 2,359 acceptors, 37% are Muslims and 63% are Hindus. The age distribution of acceptors (aged 10-49) shows that 11% are under 25 years of age, 54% are within 25-34 years and 35% are aged 35 and above. Median age of acceptors is 31.6 years and mean number of living children is 3.9. About 75% of acceptors and 53% of their husbands have no formal education. Seventy nine per cent and 5% of heads of households are engaged in agriculture and fishing respectively while the remainders are engaged in non-agricultural activities like small business, services, etc.

BRAC conducted a "Base-line Survey" in Sulla area during October-November 1975 [2]. Nineteen out of 189 villages were surveyed covering 2,329 households and 13,007 people. Some basic characteristics of female population in the area are available from this survey and can be roughly compared to those of acceptors. From the viewpoint of religion, the distribution of population shows that 35% and 65% are Muslims and Hindus respectively. The age distribution of females (aged 10-49) indicates that 47% are under 25 years of age, 25% are within 25-34 years and 28% are aged 35 and above. The median age of female population is 20 years and mean number of living children is 3.5. About 81% of females and 62% of males have no formal education. Seventy per cent of heads of households are engaged in agriculture, about 5% are engaged in fishing and the remainder are engaged in other non-agricultural activities [2]. This comparison shows that in terms of general socio-demographic characteristics the 'acceptors' group is quite representative of the overall female population in the area.

⁴ A segment is defined as the period from the commencement of use to the termination of use or to the date of enquiry when there is no termination.

⁵ With or without the cases of multiple users (37), the continuation rates were found virtually the same.

Reasons for Accepting Oral Contraception

In this sub-section we undertake to examine the distribution of acceptors by reasons for using the pill—an important matter, since we assume that the effective use of orals is closely related to the purpose for which the clients have started to practise them. In this case, the determining question was “why do you practise oral pill as a method of family planning?” It appears from Table I that 47% of all acceptors have practised oral contraception for birth spacing purpose and 48% have used them to avoid any further pregnancy. But this attitude varies more with the demographic characteristics than with the social characteristics of acceptors, as we are going to see.

TABLE I
PERCENTAGE DISTRIBUTION OF ACCEPTORS BY
REASONS FOR ACCEPTING THE ORAL PILLS

Reasons (1)	Acceptors	
	Number (2)	Percentage (3)
All*	2359	100.0
Spacing birth	1099	46.6
Stop child bearing	1136	48.2
Others	74	3.1
Not known/No response	50	2.1

* 4 schedules were lost for unknown reasons.

It appears from Table II that a greater number of Muslim users (51%) have accepted orals with a view to avoiding any more pregnancy. A large majority of younger women (81% of those aged under 25 and 70% of those aged between 25-29) and women with lower parity (78% of those with 0-2 living children) have accepted orals for the purpose of spacing pregnancies; while the majority of older women (aged 30 and above) and women with higher parity (3 and over) have used them to stop pregnancy altogether. Thus younger acceptors have been more inclined to use contraception for postponement while older acceptors have been contracepting to a large extent for total termination of child bearing. The Table further shows that majority of mothers with lower age of the

youngest child have accepted orals for spacing births. Moreover, about 93% of women desiring additional sons are using the pill as birth spacing method and 90% of women desiring no additional sons have reported to be using the pill as a terminal method. Similarly more than 90% of women desiring one or more additional daughters are using the method for the purpose of postponing births and 72% of women desiring no additional daughters have reported to be using the method to avoid any more pregnancy.

TABLE II

PERCENTAGE DISTRIBUTION OF ACCEPTORS BY SOCIO-DEMOGRAPHIC STATUS AND REASONS FOR ACCEPTING ORAL CONTRACEPTION

Specific Characteristics	Reasons				
	Spacing Birth	Stopping Birth	Others	Not Known/No Response	Total
1	2	3	4	5	6
Religion					
Muslim	45.5	51.4	1.3	1.8	100
Hindu	47.2	46.3	4.2	2.3	100
Age					
< 25	80.5	7.9	6.8	4.0	100
25-29	70.2	25.3	2.5	2.1	100
30-34	40.8	54.6	2.4	2.2	100
35 +	20.3	75.4	3.0	1.2	100
No. of Living Children					
0 - 2	77.9	11.0	7.7	3.4	100
3 - 5	41.8	55.2	1.2	1.7	100
6 +	14.2	83.0	1.5	1.3	100
Acceptor's Education					
No education	45.4	49.5	3.0	2.1	100
Some education	48.6	46.0	3.6	1.8	100
Education 5 +	51.7	42.3	3.4	2.7	100
Husband's Education					
No education	45.8	49.1	3.4	2.0	100
Some education	48.1	45.0	3.4	3.1	100
Education 5 +	47.6	48.0	2.6	1.9	100

(Contd.)

TABLE II (Contd.)

1	2	3	4	5	6
Occupation of Heads of Households					
Occupation 1	47.8	47.6	3.2	1.3	100
Occupation 2	47.1	46.1	4.0	2.7	100
Occupation 3	45.9	50.4	1.9	1.9	100
Occupation 4	42.5	50.7	2.2	4.4	100
Occupation 5	41.3	56.9	0.9	0.9	100
Occupation 6	50.4	39.8	7.1	2.7	100
Age of Youngest Living Child					
0-18 Months	55.6	41.0	1.1	2.3	100
29-36 Months	50.3	46.1	1.3	2.2	100
37-54 Months	41.4	56.7	1.4	0.5	100
35+	27.5	66.4	5.1	0.9	100
Not known/No response/	47.4	19.3	25.5	7.9	100
Not applicable					
Desire for Additional Sons					
1	92.8	0.2	5.1	1.9	100
2	92.7	—	5.7	1.6	100
3+	92.9	—	5.1	2.0	100
Desire for no additional sons	8.5	89.6	1.2	0.8	100
Not known/No Response	81.5	—	5.8	12.7	100
Desire for Additional Daughters					
1	91.4	0.2	9.3	2.0	100
2	90.2	—	7.8	2.0	100
3+	66.7	—	16.7	16.7	100
Desire for no additional daughters	25.5	72.3	1.5	0.8	100
Not known/No response	81.6	—	5.8	12.6	100

Notes :

- 1) In some cases, a few acceptors did not provide the information needed to classify them into the appropriate groups. In those cases, we have shown the percentage distribution on the basis of respondents' information alone. We believe, however, that this exclusion will not affect the result materially since in each case the number of non-respondents is relatively very small.
- 2) Occupation codes 1-6 stand for the following :
 Occupation 1 : Farmers who cultivate own land only
 Occupation 2 : Farmers who cultivate own land and leased land
 Occupation 3 : Farmers who cultivate only leased land and who are landless
 Occupation 4 : Non-agricultural labourers, business and others
 Occupation 5 : Service-holders
 Occupation 6 : Fishermen

The data relating to education and occupation of heads of households show no marked differences either in favour of "spacing" or "stopping" births among the various groups of acceptors.

IV. CONTINUATION AND DROPOUT OF ACCEPTORS

Continuation and Dropout Status

The success of any contraceptive programme depends on the continued and effective use of the method employed. The life-table continuation rates for pill acceptors are shown for the period, January 1974 to February 1976 (Table III, Col. 2). The data as earlier stated relate mostly to the first segment, i.e., the experience of clients from the start of use until the first discontinuation or the date of enquiry for continuing users. Standard error as computed is also shown against each rate.

The cumulative continuation rates appear to be impressive in the Sulla Programme area. It shows a trend of slow and steady decline as the clients advance over the cycles. The percentage of acceptors continuing for 3 cycles is 82 and for 6 cycles is 71. But the rate further declines to 61% after 12 cycles and 52% after 18 cycles. The proportion of continuing users stands at 44% after 24 cycles.

TABLE III

CUMULATIVE CONTINUATION RATES FOR ORALS BY LENGTH OF EXPOSURE (PER CENT PER CYCLES), SULLA, JANUARY 1974 TO FEBUARY 1976

Length of Exposure (cycles)	Cumulative Continuation Rates					
	+ All Acceptors (N = 2331)		*First Cohort (N = 891)		**Second Cohort (N = 1440)	
	Continuation (per cent)	Standard Error	Continuation (per cent)	Standard Error	Continuation (per cent)	Standard Error
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0	100.0	—	—	—	—	—
3	82.0	0.8	82.1	1.3	81.9	1.1
6	71.2	1.0	71.0	1.5	71.7	1.4
9	64.5	1.1	64.7	1.6	64.2	1.7
12	60.7	1.2	61.3	1.6	59.0	2.1
15	54.6	1.4	54.9	1.7	54.6	2.9
18	51.8	1.5	51.9	1.7		
21	47.6	1.9	47.6	1.9		
24	44.3	2.6	44.4	2.2		

+28 acceptors did not specify either cycles of use or terminal status and they were excluded from analysis.

*Acceptors entered between January 1974 and January 1975.

**Acceptors entered between February 1975 and February/March 1976.

It is sometimes dangerous to look into the cumulation of acceptors over several years, because in that case computation of continuation rates by the life table approach might be vitiated, especially if there are a large number of recent acceptors. In particular, this situation may result in artificially high continuation rates. In order to check whether the finding of our analysis suffers from this kind of distortion, we have segregated all acceptors into two cohorts according to the year of pill acceptance. The first cohort comprises those women who accepted the pill between January 1974 and January 1975 and the second cohort includes those who accepted between February 1975 and February/March 1976. When these two cohorts are compared with each other or with the cohort of all acceptors, almost no differences are visible between the corresponding rates (Table III).⁶

TABLE IV
DROPOUT RATES FOR ORALS BY SPECIFIED INTERVAL OF USE,
SULLA, JANUARY 1974 TO FEBRUARY 1976

Length of Exposure (cycles)	*Dropout Rates (Per cent)		
	All Acceptors	First Cohort	Second Cohort
(1)	(2)	(3)	(4)
0-3	6.0	6.0	5.0
3-6	4.4	4.5	4.2
6-9	3.1	3.0	3.5
9-12	2.0	1.8	2.7
12-15	3.4	3.5	2.5
15-18	1.7	1.8	—
18-21	2.7	2.7	—
21-24	2.3	2.3	—

P-p

$$*D = \frac{P-p}{C}$$

whereas, D=Dropout rate

P-p=Percentage decrease in the continuation rates during the interval.

C=Number of Cycles.

Table IV shows the percentage of dropouts at the 3-cycle interval for these cohorts. The highest percentage of dropout is observed between 0-3 cycles and the lowest between 15-18 cycles. As shown in Appendix Table A (2), most of those who have discontinued contraceptives declared

⁶It is further evidenced from this comparison that recall biases have not affected our analysis to the extent that we apprehended earlier in the case of all acceptors.

to have done so for medical reasons.⁷ But the proportion of those who have discontinued because of planned or accidental pregnancy is also important. Using the same data, BRAC analysed the percentage of drop-outs by reasons and found that 39% discontinued for medical reasons, 19% because they were planning to have an additional child and 16% discontinued due to accidental pregnancy [3]. However, after continued use, the proportion of those discontinuing for medical reasons drops to a low level.⁸

Among the discontinuers, the overwhelming majority claimed that they had stopped contracepting completely. Only a few discontinuers reported that they had switched over to other methods of contraception [3].⁹

As a comparative analysis with some data available from other sources may be of interest, Table V compares our data with Companiganj and Matlab project data. Companiganj is a thana located in the district of Noakhali. Christian Commission for Development in Bangladesh (CCDB) under an agreement with the Ministry of Health and Family Planning has undertaken an Integrated Health Services Project for a period of five years. It provides services to the eligible couples through clinics, sub-centres, and home visits by both males and females. The data referred to here were collected during January 1974 to April 1975. Of all acceptors, numbering 1459, 170 i.e., 11.7% were lost to follow up, primarily due to migration out of the project area, and were excluded from the analysis. The cases followed up fall into two groups: (a) acceptors of 1975 i.e., those who were seen in April 1975 or known to have dropped out before 1975, (b) acceptors of 1974 i.e., those who were seen in March or April 1975 or known to have dropped out before then.

Matlab Thana is located in the district of Comilla. The Cholera Research Laboratory in collaboration with the Ministry of Health and Population initiated, in October 1975, a house-to-house distribution programme of non-clinical methods of contraception (oral pills and condoms) in 150 villages of the Matlab Surveillance Area [16]. The remaining 84 villages,

⁷Medical reasons include all kinds of side-effects that according to the women concerned had occurred due to the use of pills, viz., vomiting, headache, dizziness, neurosis disability, mental weakness, fatigue, skin disease, disease of breast, irregular menses, bleeding between periods; disease of uterus, weight gain or loss, jaundice, etc.

⁸Details of side-effects will be examined in a forthcoming paper.

⁹The distribution of those who discontinued because either they themselves or their husbands had switched over to other methods are as follows: IUD 2, Condom 5, Vasectomy 10, Foam 5, Rhythm 3, other Traditional Methods 5.

under the regular government programme, was the control group. Contraceptive prevalence surveys were conducted before the distribution of contraceptives and every three months thereafter [16]. The baseline survey was carried out in October 1975 and the second one in February 1976, covering 100% eligible women in the area, and subsequent quarterly survey were undertaken on a 20% sample. Continuation rates were observed for each successive quarterly cohort of acceptors. The results of first and second cohort, being highest among the four, are shown in the Table for comparison.

TABLE V

**CUMULATIVE CONTINUATION RATES OBSERVED IN SULLA,
COMPANIGANJ AND MATLAB BY LENGTH OF EXPOSURE**

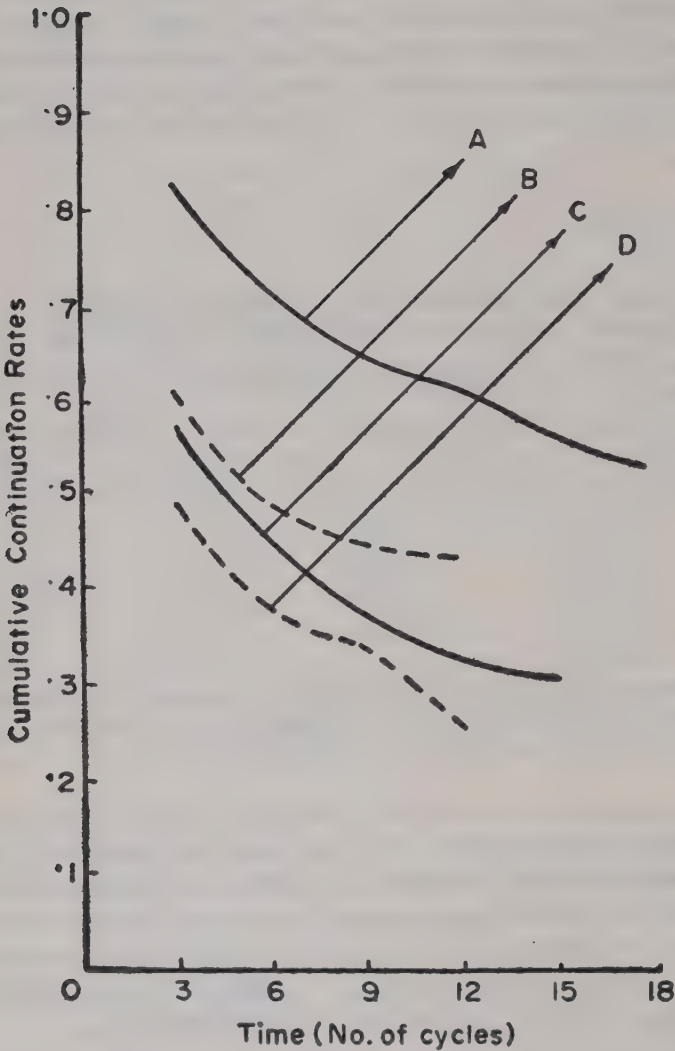
Length of Exposure (cycles)	Cumulative Continuation Rates			
	Sulla	Companiganj	Matlab	
			First Cohort	Second Cohort
(1)	(2)	(3)	(4)	(5)
0	100.0	100.0	—	—
3	82.0	60.5	57.1	49.4
6	71.2	48.3	44.5	37.9
9	64.5	43.8	37.6	34.1
12	60.7	43.0	32.3	26.3
15	54.6	—	31.3	—
18	51.8	—	—	—

Source : Column (3) is calculated from unpublished data on Companiganj Project and columns (4) and (5) from [16, Table IV].

It is worthwhile to note that the continuation rates for any given number of cycles is highest in the Sulla area and the magnitude of the difference is quite large. For example, the continuation rate after 6 cycles for Sulla is 71%, for Companiganj it is 48%, and in Matlab it is 45% for the first cohort and 38% for the second. Figure 1 also provides a clear indication of the differential pattern of cumulated continuation rates over time as appeared in Sulla, Companiganj and Matlab projects.

Even after allowing for the possible effects of methodological differences and statistical error, the difference in continuation rates between Sulla and the other areas is much too large not to have any substantive significance, and it certainly calls for some explanation. Three main reasons may account for the high continuation rates observed in

COMPARISON OF SULLA PROGRAMME
WITH OTHER PROGRAMMES



Note :

- A = Sullá
- B = Companiganj
- C = Matlab (1st Cohort)
- D = Matlab (2nd Cohort)

Figure 1

Sulla : (1) the clients are well motivated, regularly followed up and persuaded by the field staff; (2) a number of paramedics are assigned with duties to provide sufficient medical care and attention to the case of side-effects; (3) the clients' level of consciousness and aspiration for better living may be particularly high among participants since the majority of clients (79%) reported that they were participating in other sectoral programmes intended to improve their economic condition and raise their level of consciousness. Moreover, we have seen that nearly half of the clients reported that they were using orals as a terminal method, and this attitude might also have helped them to continue over a longer period.

Differentials in Continuation

In order to identify the factors behind contraceptive behaviour pattern, we have looked into the cumulative continuation rates for different socio-demographic groups of clients in addition to the observed rates for "spacers" and "stoppers".

TABLE VI

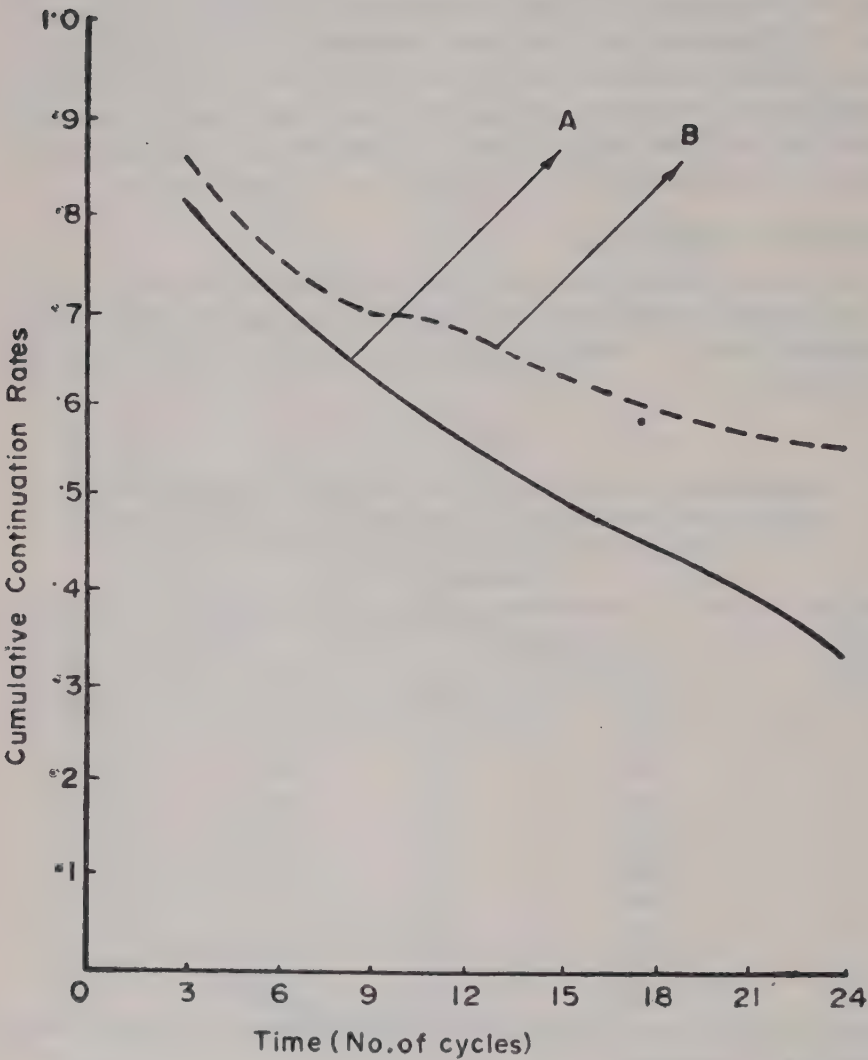
**CUMULATIVE CONTINUATION RATES FOR PILL ACCEPTORS :
BY LENGTH OF EXPOSURE (PER CENT PER CYCLES) AND
REASONS FOR ACCEPTANCE, SULLA, JANUARY 1974
TO FEBRUARY 1976**

Length of Exposure (cycles)	Cumulative Continuation Rates			
	Spacers		Stoppers	
	Per cent	S. E.	Per cent	S. E.
(1)	(2)	(3)	(4)	(5)
0	—	—	—	—
3	80.5	1.3	86.1	1.1
6	70.7	1.5	75.8	1.4
9	62.2	1.7	70.2	1.6
12	56.3	1.9	67.7	1.6
15	48.6	2.1	62.9	1.8
18	45.0	2.3	60.4	1.9
21	39.7	2.7	56.3	2.2
24	33.4	4.0	55.3	2.4

"Spacers" Vs. "Stoppers"

Before we look into the differentials by socio-demographic variables, we should find out the continuation rates for "spacers" and "stoppers", because we believe that a comparison of the continuation rates for these two groups can help us explain the acceptors' contraceptive behaviour.

COMPARISON OF SPACERS AND STOPPERS BEHAVIOUR



Note :

A = Spacers

B = Stoppers

Figure 2

Figure 2 based on Table VI shows higher continuation rates for the cohort of "stoppers" at any given number of cycles. The magnitude of differences, depicted by curves with corresponding rates, is markedly visible and becomes progressively wider as the acceptors in the two groups are cumulated over increasing number of cycles. The higher continuation rates for "stoppers" is undoubtedly an expected behaviour.

TABLE VII

CUMULATIVE CONTINUATION RATES (PER CENT) OF ORAL CONTRACEPTION BY LENGTH OF EXPOSURE AND SOCIO-DEMOGRAPHIC STATUS OF ACCEPTORS, SULLA, JANUARY 1974 TO FEBRUARY 1976

Specific Characteristics	Length of Exposure (cycles)			
	6	12	18	21
(1)	(2)	(3)	(4)	(5)
a) Religion				
Muslim	73.5	64.5	57.2	54.7
Hindu	69.8	58.4	48.8	43.8
b) Age				
<25	65.5	53.8	44.8	—
25-29	72.2	60.3	49.7	46.3
30-34	70.6	58.1	53.8	47.2
35+	72.8	64.6	54.3	50.2
c) Number of Living Children				
0-2	65.8	52.7	43.7	38.2
3-5	75.1	64.4	56.0	51.6
6+	70.0	63.1	52.3	49.3
d) Acceptors' Education				
No education	70.6	60.0	49.4	47.3
Some education	72.2	61.9	52.7	49.4
Education 5+	72.9	61.5	53.8	50.0
No response/Not known	(*)	(*)	(*)	(*)
e) Husbands' Education				
No education	70.1	60.9	50.0	45.3
Some education	71.8	58.3	50.6	48.6
Education 5+	72.9	63.0	54.0	51.1
No response/Not known	(*)	(*)	(*)	(*)

(Contd.)

TABLE VII (Contd.)

	(1)	(2)	(3)	(4)	(5)
f) Occupation of Heads of Households					
Occupation 1		69.4	58.9	50.3	45.8
Occupation 2		69.1	57.3	48.6	43.9
Occupation 3		74.6	62.4	53.3	50.9
Occupation 4		73.9	66.6	58.5	—
Occupation 5		69.2	59.4	50.0	37.5
Occupation 6		74.1	67.2	62.6	—
g) Age of Youngest Living Child					
0-18 Months		63.1	47.6	35.4	—
19-36 ..		77.9	68.1	58.3	53.8
37-54 ..		74.9	64.3	55.7	51.9
55+		66.7	56.9	48.5	42.8
No response/Not known/ Not applied		60.0	52.3	46.1	—
h) Desire for Additional Sons					
1		71.6	56.8	41.4	33.1
2		67.8	51.1	47.5	—
3+		72.1	66.2	55.5	51.5
Desire for no additional sons		74.4	66.1	58.3	54.5
No response/Not known		53.2	44.5	31.6	27.1
i) Desire for Additional Daughters					
1		58.8	65.5	43.6	35.7
2		61.2	40.3	30.6	—
3+		(*)	(*)	(*)	(*)
Desire for no additional girls		74.8	65.5	57.4	53.6
No response/Not known		53.5	45.0	32.2	27.6

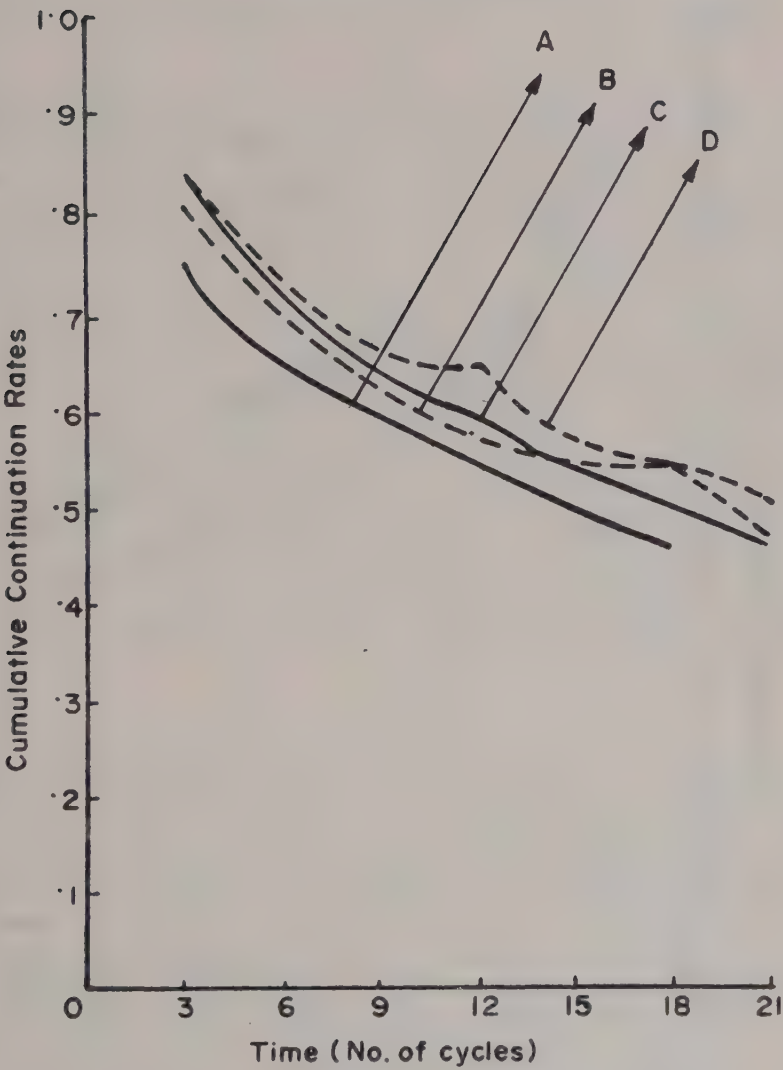
Notes : (1) The parentheses with star indicate that the number of acceptors was below 15 and their case was not analysed.

(2) For the meaning of occupation codes, see notes to Table II.

Religion

Against the received idea that the Hindus might have a more consistent behaviour in using contraception, the cumulative continuation rates for the Muslims in Sulla are found to be strikingly higher than for the Hindus at all cycles, although their age distributions do not differ widely Table VII.

COHORTS BEHAVIOUR WITH AGE

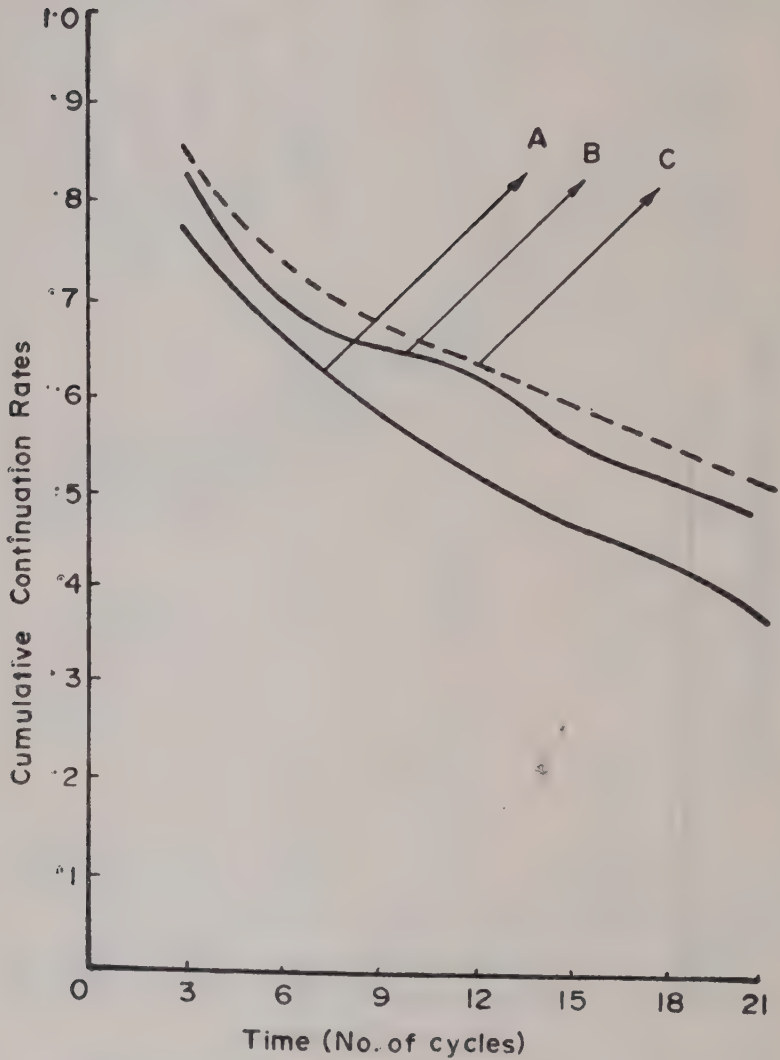


Note:

- A = < 25
- B = 25-29
- C = 30-34
- D = 35 +

Figure 3

COHORTS BEHAVIOUR WITH No. OF LIVING CHILDREN



Note :
A = 0-2
B = 3-5
C = 6+

Figure 4

In the previous section we have seen that a greater proportion of the Muslims are inclined to use the pill as a means of stopping child bearing. This attitude might have resulted in a more persistent use of the method. Concurrently the proportion of users who discontinue in favour of an additional planned pregnancy is also smaller among the Muslims.

Age

The analysis reveals that, in general, older women tend to have higher cumulative continuation rates (Table VII). For any given number of cycles the rates are the lowest for the group aged under 25, while the percentage continuing for each cycle is the highest for the group aged 35 and above. This pattern seems to reflect the behaviour of two distinct groups of women, viz., those who reported the pill use for spacing births and those who reported it as a terminal method, the proportion discontinuing for planned pregnancy being higher in the former group than in the latter. It also appears that women belonging to the age group 25-29 are more persistent users of the pill. In fact the pattern observed in this group for the first 6 cycles does not differ from the pattern observed among women aged 35 and above. However, with the increase of cycles, marked differentials begin to appear (Figure 3). This can perhaps be explained by the fact that 70% of women aged 25-29 accepted orals for spacing purpose, so that discontinuation in favour of an additional pregnancy may have increased with the increase in number of cycles.

Parity

The lowest continuation rates are found among pill acceptors with parity 0-2 (Table VII). Moreover, the difference in the rates between this group and the others becomes progressively wider as the number of cycles increases (Figure 4). The women in this parity group (0-2) are presumably very fertile. Clearly, they have not yet completed their expected family size, since 78% of them are reported to be contracepting for the purpose of spacing births ; and for them planned pregnancy appears to be the prime reason for higher rate of discontinuation. The proportion reporting discontinuation due to medical reasons is also quite large within this group. Orals are used most persistently by women belonging to the parity group 3-5 as evidenced by their higher continuation rates. For women of parity 6 and over, the relatively low continuation rate upto 6 cycles is noteworthy. For them, medical reasons and reaching menopause appear to be the main causes for contraceptive discontinuation.

Literacy

A comparison of three categories of education, viz., no formal education, some education and 5 years or more of completed schooling for either acceptors or their husbands is presented in Table VII. The continuation rates are marginally higher for women who have completed five years' or more schooling. There is no marked differences between other groups. Likewise, acceptors who reported the level of their husbands' education to be 5 or more years' of schooling have slightly higher continuation rates than those whose husbands were declared to have no formal education or some education. This suggests that the persistent use of oral contraception is positively related with spouses' education beyond primary level. However, only marginally lower continuation rates observed in other groups support the contention [5] that the couples without formal education or with some education are not inefficient users of the pill if properly motivated.

Working Status

As mentioned earlier working status of heads of households is considered as a "proxy" indicator in order to determine the working status of acceptors. There are no marked differentials in the continuation rates among the various cultivators' groups or with the service-holders' groups (Table VII). But it appears that acceptors in the households of fishermen and other non-agricultural labourers have higher continuation rates on the whole, although the magnitude of differences is quite small. The reason behind this difference is, however, difficult to identify.

Age of the Youngest Child

It appears from Table VII that the percentage of cumulative continuation rates is the lowest for women whose youngest child was aged between 0-18 months. Two reasons may account for the higher discontinuation rate in this group: (1) most of the clients were lactating mothers and they might have thought that they were under natural protection, and (2) as 56% of them reported the use of orals for postponing births, they might have decided at certain stage to plan for additional children. Mothers with the youngest child aged 55 or more months have comparatively lower continuation rates probably because of biological factor, viz., most or at least many of them may have reached menopause.

Additional Children

It is apparent from Table VII that the continuation rates are higher for those acceptors who do not desire any additional sons while the continuation rates for those who desire one or more additional sons are lower. Likewise, the continuation rates are higher for women desiring no additional daughters than for those desiring one or more additional daughters. Thus the data suggest that the effective use of orals is inversely related to the desire for additional children.

V. CONCLUDING REMARKS

This study deals with oral contraceptors: their characteristics, the reasons for which they have accepted orals and their contraceptive behaviour. Two distinct groups of women were first identified: (1) women who have accepted orals for spacing births, and (2) those who have accepted for total termination of child bearing. The former group is younger and is composed of women having fewer living children and desiring additional babies. The latter group is comparatively older and the women in this group have a greater number of living children and they generally desire no additional babies. Use-pattern of oral pills as identified by the indicator 'life table continuation rates' is lower in the former group than in the latter.

This finding has an important implication for programme officials and policy makers. Firstly, younger women and women with lower parity may be encouraged to accept and continue with a temporary method like oral contraception which will help them in spacing pregnancies. Secondly, the relatively older women and women with higher parity may be encouraged to adopt a suitable terminal method like tubal-ligation, or vasectomy for their husbands, which will help them stop child bearing.

One of the main purposes of this study was to determine why some women discontinue oral contraception while others do not. Apart from 'method failure', it is observed that women who have accepted orals for spacing purpose gradually discontinue as they later on decide to have more children. But according to the discontinuers themselves medical and health reasons are by far the most important reasons for stopping contraception—a finding which is equally supported by Matlab data [13]. A bio-medical analysis should be specifically undertaken to assess whether the various brands of oral pills distributed in the programme

area or other areas of Bangladesh are actually suitable for Bangalee women. Moreover, medical facilities and attention should be made available to obviate the problems of side effects experienced by the contraceptors, especially at the initial cycles of use. Paramedics and health clinics can go a long way towards solving this problem; but health infrastructure remains very poor in the rural areas and would need high priority to meet the present demand.

A question of primary importance is whether an overwhelming majority of women who are rural and illiterate in our society will effectively use the orals. The data show an overall high continuation rate over a period of time in the Sulla project area and this suggests that the pill can be an acceptable and effective method for the womenfolk in our society.

Another important question that needs to be answered is whether it is possible to replicate this result in other regions of Bangladesh, and if so, how? To seek answer to this question, it is not unwise to look at the operational setting of BRAC. Besides having an effective operational structure, a sense of dedication is created among BRAC workers who work on team basis. What is important is that the eligible couples are persuaded again and again and the clients are well motivated. The acceptors are regularly followed up and in the case of side-effects, they are provided with medical care. Clinical facilities are also provided to the patients when necessary. Functional education activities as well as group and community discussions seem to be helpful in enhancing the level of motivation of the couples. The programme for economic support as conducted by BRAC is equally important. All this along with other sectoral programmes has probably raised the level of aspiration for better living among the participants. Furthermore, accessibility to the family planning services and pattern of distribution has been carefully designed to ensure efficient performance.

We do not mean to suggest that the structural organisation of BRAC could be replicated everywhere: what we intend to suggest, however, is that the factors behind the success in Sulla should be identified and taken into account while trying to replicate Sulla's success elsewhere.

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Appendix A

In order to construct life table the following notations are used [1] :

X = duration in three monthly units.

$N_x^{(T)}$ = number of women using pills at the beginning of the period X .

P_x = number of women terminating use of pills to become pregnant during the period X .

M_x = number of women terminating use of pills for medical and health reasons during the period X .

A_x = number of women terminating use of pills for accidental pregnancy during the period X .

F_x = number of women terminating use of pills for fear of the method or due to husbands' unwillingness during the period X .

D_x = number of women terminating use of pills since they no longer require it during period X .

O_x = number of women terminating use of pills for all other reasons¹ during the period X .

$$T_x = P_x + M_x + A_x + F_x + D_x + O_x$$

W_x = number of users last observed during the period X .

The decrement rates for various causes as computed are called net rates [1]. The formula for calculation of net rates are as follows :

$$q_x^{(P)} = P_x / N_x^{*(T)}, \text{ etc.}$$

$$\text{where } N_x^{*(T)} = N_x^{(T)} - (W_x/2)$$

This allows a provision that if the loss rate is uniform, those who stop use of the pill in a given period of time are "on an average exposed only half the time to the risk of pregnancy or other decrements" [1].

$$q_x^{(T)} = q_x^{(P)} + q_x^{(M)} + q_x^{(A)} + q_x^{(F)} + q_x^{(D)} + q_x^{(O)}$$

and $p_x^{(T)} = 1 - q_x^{(T)}$

¹Other reasons include religious bar, no supply of pills, sterilized cases, switched over cases to other methods, etc.

$$\text{while, } P_x^{(T)} = \prod_{x=1}^X p_x^{(T)}$$

$P_x^{(T)}$ is known as continuation rate at the end of X period of time in oral contraception use.

Standard errors have been computed with the following formula [1] :

$$1 = \text{SE. of } P_x^{(T)} = P_x^{(T)} \left[\sum_{x=1}^X \frac{q_x^{(T)}}{p_x^{(T)} N_x^{* (T)}} \right]^{\frac{1}{2}}$$

APPENDIX TABLE A (1)

ALL ACCEPTORS : ORAL CONTRACEPTIVES BY LENGTH OF USE AND CURRENT STATUS, SULLA

Length of Exposure (cycles)	Current Status																	
	Planning Pregnancy		Medical Reasons		Accidental Pregnancy		Fear Method /Husbands, Unwilling		Don't Need Any More		Others		Total having Discontinued		Continuing Users		All Acceptors N = 2331*	
	P	X	M	X	A	X	F	X	D	X	O	X	T	X	W	X	T + W	X + X
X																		
0-3	64		111		58		42		43		64		382		414		796	
4-6	43		53		31		11		22		23		183		293		476	
7-9	19		32		18		3		10		10		92		166		258	
10-12	12		14		10		2		2		4		44		109		153	
13-15	9		20		6		5		9		7		56		183		239	
16-18	3		6		4		—		1		4		18		122		140	
19-21	4		6		2		—		3		1		16		146		162	
22-24	2		1		1		1		—		—		5		66		71	
25+	—		1		—		1		1		—		3		53		36	
Total	156		244		130		65		91		113		799		1532		2331	

APPENDIX TABLE A (2)

ALL ACCEPTORS : DECREMENTAL RATES BY CAUSE OF TERMINATION AND LENGTH OF EXPOSURE

Length of Exposure (cycles)	No. at Beginning		Adjusted No. Exposed * (T)		Probability of Termination								Cumulative Continuation Rates (T) P x	S. E.	
	N	x	N	x	Planning Pregnancy (p)	Medical Reasons (m)	Accidental Pregnancy (a)	Fear Method (f)	Don't Need (d)	Others (o)	Total (T) q x	1-q = p x			
0-3	2331		2124		.0301	.0522	.0273	.0197	.0202	.0301	.1798	.8202	.8202	.8202	.008
4-6	1535		1389		.0309	.0381	.0223	.0079	.0158	.0165	.1317	.8683	.7121	.7121	.010
7-9	1059		976		.0194	.0327	.0184	.0031	.0102	.0102	.0942	.9058	.6451	.6451	.011
10-12	801		747		.0160	.0187	.0133	.0026	.0026	.0053	.0589	.9411	.6071	.6071	.012
13-15	648		557		.0161	.0359	.0107	.0089	.0161	.0125	.1005	.8995	.5461	.5461	.014
16-18	409		348		.0086	.0172	.0114	—	.0028	.0114	.0517	.9483	.5178	.5178	.015
19-21	269		196		.0204	.0306	.0102	—	.0153	.0051	.0816	.9184	.4755	.4755	.019
22-24	107		74		.0270	.0135	.0135	.0135	—	—	.0675	.9325	.4434	.4434	.026
25 +	36		20		—	.0500	—	.0500	.0500	—	.1500	.8500	.3769	.3769	.057

The Bangkok Agreement: An Evaluation of its Implications in Trade Liberalisation in Asia

by

I. N. MUKHERJEE*

The Bangkok agreement, signed under the auspices of the United Nations Economic Commission for Asia and the Pacific (ESCAP), is Asia's first multilateral trade liberalisation effort leading to the establishment of a preferential trading arrangement in the region. After tracing the roots of cooperation in trade culminating in the signing of the Agreement, this paper examines the possible distribution of benefits among the member countries. Using alternative criteria to measure the exchange of benefits, it is contended that its implementation, in its present form, is likely to lead to imbalances, particularly between the relatively developed and the less developed member countries. Accordingly some policy guidelines are suggested with a view to moderating the imbalances.

I. INTRODUCTION

The significance of the Bangkok Agreement, signed under the auspices of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) lies in the fact that this is Asia's first multilateral trade liberalisation effort towards the establishment of a preferential trading arrangement in the region. The objective of the present study is to evaluate this Agreement in terms of the inter-country distribution of benefits likely to result from its implementation and to suggest some policy measures to ensure an equitable distribution of the expected benefits.

The paper is organised as follows. Section II of this paper traces the roots of cooperation in trade in the ESCAP region culminating in the signing of the Bangkok Agreement, and examines briefly, its salient features. The products offered under the Agreement for trade with concessional tariffs are identified in Section III. The likely exchange of benefits between the partici-

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pating countries, as a result of implementing the Agreement, are examined in Section IV by using a number of criteria. We next examine in Section V the relative importance of the source of imports of negotiated products from participating as well as non-participating countries, in order to assess the potentiality of further trade liberalisation. In Section VI we suggest additional possible concessions which might be offered in future rounds of negotiations by the participating countries so as to moderate imbalances in the exchange of concessions. The final section summarises our findings and points out some limitations of our study.

II. RECORD OF COOPERATION IN TRADE

The role of the ESCAP in fostering cooperation in trade in the initial years was limited in scope. Its main function during the fifties was to undertake research, act as a clearing house of commercial information, and to organise, from time to time, regional conferences on trade promotion. It was only in the sixties that the idea of intra-regional trade liberalisation through the elimination of tariff and non-tariff barriers on trade was conceived and the Executive Secretary of the ESCAP set up several Working Groups on Trade Liberalisation to undertake the necessary technical studies in this direction. At the same time the convening of Ministerial Conferences on Asian Economic Cooperation in 1963, 1968 and 1970, gave considerable political significance to these efforts.

At its fourth session in 1970, the Council of Ministers decided, among other measures, to establish an Inter-governmental Committee comprising representatives of regional member and associate member countries of the ESCAP, interested in initiating a trade expansion programme. The Committee presented a seven-point blueprint on Asian Trade Expansion Programme and recommended the formation of a Trade Negotiations Group (TNG) consisting exclusively of developing member and associate member countries in the programme. The constitution of the TNG framed in early 1972, was an important landmark in the development of appropriate institutions to facilitate intra-regional trade expansion among developing member countries of the ESCAP

It was in the fifth meeting of the TNG convened from 1-31 July, that the first ever trade agreement among developing member countries of the ESCAP, known as the Bangkok Agreement, was signed.¹

¹ The seven TNG countries which signed the Agreement were Bangladesh, India, Sri Lanka, Thailand, the Philippines, Lao People's Democratic Republic, and Republic

The objective of the Bangkok Agreement is, *inter alia*, for each member country to apply such tariff and non-tariff concessions in favour of goods originating in all other member countries as are set out in their respective National list of Concessions attached to the Agreement. What is envisaged is a preferential trading arrangement with certain built-in safeguard clauses.²

III. IDENTIFICATION OF PRODUCTS OFFERED FOR CONCESSION

The first step in an attempt to evaluate the value of concessions exchanged between the participating countries under the Bangkok Agreement is to identify the products, the trade in which is sought to be liberalised. Under the Agreement, as many as 150 products have been granted concessions multilaterally by the seven original signatories to the Agreement.³

The products offered for concessions are however at different levels of aggregation. What is necessary, therefore, is to identify the products in respect of which concessions have been granted and to examine the value of trade in respect of such products.

Annex 1 to the Bangkok Agreement contains the National Lists of Concessions. It carries a short description of the products with the relevant product code as under Brussels Tariff Nomenclature (BTN) at four digit level or part thereof. But all the participating countries did not present their national trade statistics in BTN code. For translating BTN code into SITC code, the UN publication entitled "Standard International Trade

of Korea. All the aforementioned countries, excluding Thailand and the Phillipines have ratified the Agreement. Of these five countries Bangladesh, India and Republic of Korea have issued the necessary customs notification for the implementation of the Agreement, while the other two are expected to follow shortly.

² For a record of cooperation in trade under the ESCAP, see [2] and for details of the Bangkok agreement, see [3].

³ Of these, Bangladesh has granted concessions in respect of 23 products, India in respect of 12 products, Laos in respect of 28 products, Republic of Korea in respect of 23 products, Sri Lanka in respect of 34 products, and Phillipines and Thailand in respect of 11 and 19 products respectively. In addition, special concessions in respect of 25 products has been granted to Laos. Of these, six products have been offered by Bangladesh, four by India, five by Republic of Korea, two each by Sri Lanka and the Phillipines, and six by Thailand.

Classification (Revised)" has been used [4]. In cases where all product groups and sub-groups under the four digit BTN classification qualify for concessions, product identification does not pose any problem. However, in most of the cases the products in respect of which concessions have been granted form a part of the four digit level classification. In order to identify these products, the product description presented in Annex I to the Agreement is compared with those presented in the participating countries' national trade publications. These products form subgroups of the broader group indicated in BTN code under the Agreement. Once identified, the import values in respect of commodities included in National Lists of Concessions of participating countries is observed by source of imports from participating countries, principal non-participating countries, and all countries. In most of the cases products have been identified by this method. However, when the product description as presented under the Agreement does not conform to those presented in the national trade publication of the participating countries, or when the latter is not adequately disaggregated, it is seen whether the product description presented in respect of exports of similar products by partner participating countries conforms more nearly to those presented under the Agreement. When this is so, the export values (FOB) of partner countries is used to which a margin of 15 per cent is added so as to estimate the CIF import value.

In case of some countries, it was noticed that imports of some items in respect of which it had granted concessions, were not reflected in their import data, whereas such products figured in the export statistics of some participating partner country. In such cases, the export values were treated as imports of negotiated products of the country offering concessions. A margin of 15 per cent was, however, added to such export values so as to translate the FOB export value to CIF value from the point of view of the importing country.

All import values of participating countries have been expressed in terms of US dollars. The Phillipines and Republic of Korea express their trade values in dollars. In case of other countries the local currency values have been converted into dollars on the basis of average exchange rates prevalent for the period under study (namely, calendar year 1974) as presented in IMF, *International Financial Statistics*. In assessing the exchange of concessions, we have made two estimates—one including the non-ratifying countries, Thailand and the Phillipines, and the other excluding them. These alternative estimates are necessary since it is now doubtful whether these two member countries of the ASEAN, would ever ratify the Agreement.

IV. THE EXCHANGE OF CONCESSIONS BY PARTICIPATING COUNTRIES

The Value and Proportion of Intra-regional Trade Liberalised

We shall now examine the value of concessions exchanged by the participating countries. For this purpose, we shall first examine the value and proportion of intra-regional trade liberalised. This is done by first examining the intra-regional trade matrix of the participating countries, which has been presented in Table I.

TABLE I
PARTICIPATING COUNTRIES' INTRA-REGIONAL IMPORTS, 1974
(Million US Dollars)

Of From	India	Sri Lanka	Bangla- desh	Philli- pines	Thailand	Laos	Repub- lic of Korea	All Participa- ting Countries
India	—	34.19	81.60	6.90	18.00	0.04	11.54	152.27 (127.37)
Sri Lanka	0.20	—	2.98	—	0.20	—	—	3.30 (3.10)
Bangla- desh	10.40	1.01	—	—	0.10	—	—	11.51 (11.41)
Thailand	3.00 (—)	8.00 (—)	0.50 (—)	16.0	—	27.72	40.28 ^b	95.50 (—)
Phillipines	1.30 (—)	0.11 (—)	1.80 ^b (—)	—	4.70	0.20	28.95	37.06 (—)
Laos			2.90	—	7.60	—	—	10.50 (2.90)
Republic of Korea	3.60	2.78 ^b	10.10	9.10	19.10	9.69 ^c	—	45.37 (16.52)
All Partici- pating Countries	18.50 (14.20)	46.09 (37.98)	99.80 (97.50)	32.00 (—)	49.70 (—)	28.65 (0.93)	80.77 (11.54)	355.51 (161.95)

Sources : *Direction of Trade (DOT), Annual 1969—75, International Monetary Fund*

Notes : ^a Refers to *DOT, Annual 1960—74* owing to inadequate coverage of data in *DOT, Annual 1960—75*.

^b The *DOT* did not present any import value in respect of these countries with some partner participating countries, although sizeable imports of negotiated products were observed. In such cases the national import statistics of participating countries has been considered.

^c This is based on the value of Republic of Korea's exports to Laos with a margin of 15 per cent added to it. The *DOT* source appeared to be inaccurate since Laotian imports of negotiated products exceeded the *DOT* value of total imports of Laos from Republic of Korea.

It will be seen from the Table that the total intra-regional imports of the participating countries amounted to \$ 355 million during the calendar year 1974.⁴ Looking at import values of individual countries, it will be seen that India's imports from all participating countries is considerably

TABLE II (a)
IMPORTS OF NEGOTIATED PRODUCTS BY PARTICIPATING
COUNTRIES, 1974
(Thousand US Dollars, CIF)

Of From	India	Sri Lanka	Bangladesh	Philippines	Thailand	Laos	Republic of Korea	All Participating Countries
India	—	15106	591	5	395	9	24	16130 (15730)
Sri Lanka	201	—	156	7	80	—	—	444 (357)
Bangladesh	9	287	—	—	—	—	—	296 (296)
Philippines	—	—	223	—	15	—	1	248 (—)
Thailand	121	3742	—	—	—	233	379	4475 (—)
Laos	—	—	—	—	6697	—	—	6697 (—)
Republic of Korea	100	1352	1996	499	1623	183	—	5753 (3631)
All Participating Countries	431 (310)	20487 (16745)	2976 (2743)	511 (—)	8810 (—)	425 (192)	403 (25)	34043 (20015)

Source : The data has been compiled from the national trade publications of participating countries.

Note : The national trade publications of the Philippines and Republic of Korea express trade values in US dollars. For other countries the local currency values were translated into US dollars on the basis of average exchange rate with the US dollar for the calendar year 1974 as presented in IMF *International Financial Statistics*. The import data for Bangladesh has been obtained, from export values (FOB) of participating partner countries, to which a margin of 15 per cent has been added so as to confirm to CIF values. The Loatian import data was available only for the period January-September 1974. Hence a margin of 25 per cent has been added to the import values so as to approximate annual values.

Figures in brackets indicate value of imports of negotiated products by all participating countries excluding Thailand and the Philippines.

⁴ If Thailand and the Philippines were excluded, we notice that the level of intra-regional trade is reduced by less than half to \$ 162 million.

less than all other participating countries' imports from India. In other words, India has a considerable surplus of trade, *vis-a-vis* other participating countries. Thailand also has a surplus, but it is not to the extent of that of India. In case of Sri Lanka, Bangladesh, and Laos, the reverse is true; the imports of these countries from the participating countries are considerably in excess of other participating countries' import from them. These are the principal deficit countries in the region. The intra-regional trade of the Philippines and the Republic of Korea is more balanced.

We shall now turn to examine the value of intra-regional trade liberalised. The value of imports of negotiated products liberalised by the participating countries in favour of each other is presented in absolute and percentage terms in Tables II(a) and II (b) respectively.

TABLE II (b)

CONCESSIONS OFFERED AND RECEIVED AS PER CENT OF INTRA-REGIONAL TRADE LIBERALISED BY PARTICIPATING COUNTRIES

Offered by Received by	India	Sri Lanka	Bangladesh	Philippines	Thailand	Laos	Republic of Korea	All Participating Countries
India	—	44.37 (75.48)	1.74 (2.95)	0.01	1.16 (—)	0.03 (0.04)	0.07 (0.12)	47.38 (78.59)
Sri Lanka	0.59 (1.00)	—	0.46 (0.78)	0.02	0.23	—	—	1.30 (1.78)
Bangladesh	0.03 (0.04)	0.84 (1.44)	—	—	—	—	—	0.87 (1.48)
Philippines	—	—	0.68	—	0.04	—	—	0.72 (—)
Thailand	0.35	10.99	—	—	—	0.68	1.11	13.15 (—)
Laos	—	—	—	—	19.67	—	—	19.67 (—)
Republic of Korea	0.23 (0.50)	3.97 (6.75)	5.86 (9.97)	1.52 (—)	4.77 (—)	0.54 (0.91)	—	16.90 (18.14)
All Participating Countries	1.27 (1.55)	60.18 (83.75)	8.74 (13.72)	1.50 (—)	25.88 (—)	1.25 (0.96)	1.18 (0.11)	100.00 (100.00)

Note: The values have been expressed in percentages of total intra-participating countries, imports of negotiated products as presented in Table II (a).

Figures in brackets are estimates of concessions exchanged exclusive of Thailand and the Philippines.

It is interesting to note that the two relatively developed countries, India and Republic of Korea, offer only about 1.27 and 1.18 per cent respectively of the total intra-regional trade liberalised, whereas the two relatively less developed countries, Sri Lanka and Bangladesh, account for as 60.18 and 8.74 per cent respectively. Although Thailand accounts for about 25.88 per cent of the intra-regional trade liberalised, about 76 per cent of this is on account of special concessions granted in favour of Laos. Viewed from a somewhat different angle, it will be seen that as much as 47.4 per cent of liberalised imports have been offered by all participating countries in favour of India alone, whereas the extent of liberalised imports in favour of Sri Lanka and Bangladesh by all participating countries amounts to only 1.3 per cent and 0.87 per cent respectively.

When Thailand and the Phillipines are excluded, the value of intra-regional trade liberalised is reduced to only \$20 million. Particularly affected by their exclusion is Laos which had received substantial concessions of a special nature from Thailand. The imports of liberalised products by Republic of Korea is also reduced to negligible proportions while it loses about \$1.6 million worth of liberalised imports from Thailand. The effect of these factors is that the differences in the relative contributions of the five remaining participating countries towards trade liberalisation gets further widened. It can be noticed for instance that concessions offered by Sri Lanka and Bangladesh now account for as much as 83.75 per cent and 13.72 per cent respectively of the total intra-regional trade liberalised, while the remaining three countries account for only 2.62 per cent. The contribution of Republic of Korea (whose concessions were mainly in favour of Thailand), is reduced to negligible proportions, while that of India (which had also offered concessions in favour of Thailand), is reduced considerably.

The same general picture of imbalance in the magnitude of concessions offered to end by the participating countries emerges also when we define the extent of liberalisation, not as the absolute volume of trade liberalised as has been done above, but as the share of each country's liberalised trade in its total trade with the rest of the participating countries. Figures in Table III confirm this observation.

Revenue Implications of Trade Liberalisation

Another method which may be used to examine the exchange of concessions is to estimate the possible loss in customs revenue of the participating governments following trade liberalisation. Assuming that

TABLE III
SHARE OF LIBERALISED TRADE IN THE TOTAL TRADE OF THE PARTICIPATING COUNTRIES
WITH EACH OTHER, 1974

Imports of	India	Sri Lanka	Bangladesh	Philippines	Thailand	Laos	Republic of Korea	All participating Countries
Imports from								
India	—	44.18	0.72	0.07	2.19	22.50	0.21	10.59 (12.34)
Sri Lanka	100	—	5.45	—	40.00	—	—	111.00 ^a (178)
Bangladesh	0.08	28.41	—	—	—	—	—	2.57
Philippines	—	—	12.93	—	0.32	—	—	0.66
Thailand	4.03	46.77	—	—	—	0.84	0.94	4.69
Laos	—	—	—	—	88.12	—	—	63.78
Republic of Korea	2.78	48.72	19.76	9.54	8.50	26.52	—	(—) 12.68
All participating Countries	2.33 (2.18)	47.30 (47.57)	3.13 (2.90)	1.60 (—)	17.69 (—)	1.48 (20.65)	0.99 (0.20)	9.8 (12.36)

Source : This table has been estimated from Tables I and II (a).

^aThe values exceed 100 per cent possibly due to incomplete coverage of other participating countries' imports from Sri Lanka in IMF, *Direction of Trade*.

imports from participating countries are likely to be inelastic in the short run, a rough measure of the loss in customs revenue can be obtained by taking the difference in the tariff rate as between non-preferred and preferred sources, and applying it to imports from preferred sources and aggregating the value over all products for which tariff concessions have been made. This may be expressed algebraically as follows :

$$R = \sum_i I_i (T_i - T_{pi})$$

where, R is the loss in customs revenue, I_i is the value of imports of commodity i , T_i and T_{pi} are the non-preferred and preferred tariff rates applicable to imports of commodity i . It may be mentioned here that R is only a rough estimate of the extent of revenue loss by the participating (importing) governments, since it is a matter of further empirical verification as to which party gains from tariff reduction. If the reduction in tariff leads to a fall in the domestic price of imported products, then consumers of the importing country benefit. It is also possible that this merely improves the trading margin of the importer, whereas the domestic prices remain unaffected. There is also the possibility that as a consequence of tariff reduction, the exporters of preference receiving country experience higher unit value realisation in respect of their exports. Each of these possibilities is dependent on the relative elasticities of demand and supply as between producers and exporters of preference receiving countries, and importers and consumers of preference giving countries. Since the process of implementation of trade liberalisation is yet incomplete, we have viewed this problem merely from the point of view of potential loss of customs revenue which each participating government is likely to sustain as a result of tariff reduction.

In Table IV we have presented the possible loss in customs revenue which each participating government sustains as a result of tariff reduction in respect of imports from other participating countries. It may be mentioned here that the Phillipines has not reduced its tariff rate, but bound it at the existing low level. It will be seen that, in all, the participating governments are likely to lose about 2.2 million dollars as a result of trade liberalisation. This loss is, however, very unevently distributed. Whereas Sri Lanka and Bangladesh lose about 48 per cent and 22 per cent respectively of revenue to all other countries, all other countries taken together lose only about 2.2 per cent and 1.7 per cent of revenue to Sri Lanka and Bangladesh respectively. On the other hand, India, Thailand, and Republic of Korea lose about 3 per cent, 9.4 per cent and 17 per cent respectively of the total revenue

to the other participating countries, while the latter together lose about 31 per cent, 23 per cent and 33 per cent respectively to these three countries.

If Thailand is excluded from the Agreement, the total revenue loss will be shared even more unequally by the five remaining participating countries. Sri Lanka and Bangladesh would sustain some 67 per cent and 28 per cent of the revenue loss to all other participating countries, whereas the latter together would lose about 3 per cent and 2.7 per cent to these two countries respectively. The Republic of Korea would sustain a negligible amount of revenue loss to other participating countries, whereas the other participating countries together would account for as much as 48 per cent of the revenue loss to this country.

TABLE IV
ANTICIPATED LOSS IN CUSTOMS REVENUE OF PARTICIPATING
COUNTRIES AS A RESULT OF TRADE LIBERALISATION, 1974

(Thousand US Dollars)

Lost by Los to	India	Bangla- desh	Sri- Lanka	Thai- land	Laos	Republic of Korea	All Parti- cipating Countries	% of Total Revenue Loss
India	—	106	534	37	1	8	686 (649)	30.87 (45.70)
Bangla- desh	1	—	36	—	—	—	37 (37)	1.67 (2.60)
Sri Lanka	34	15	—	—	—	—	49 (49)	2.20 (3.45)
Thailand	15	—	109	—	12	365	501 (—)	22.55 (—)
Phillipines	—	93	—	—	—	0.10	93 (0.10)	4.18 (—)
Laos	—	—	—	117	—	—	117 (—)	5.26 (—)
Republic of Korea	18	273	382	54	12	—	739 (685)	33.26 (48.24)
All Parti- cipating Countries	68 (53)	487 (394)	1061 (952)	208 (—)	25 (13)	373 (8)	2222 (1420)	100.00 100.00
% of Total Revenue Loss	3.06 (3.73)	21.92 (27.74)	47.75 (67.04)	9.36 (—)	1.13 (0.92)	16.78 (0.56)	100	—

Note : For method of estimation see text. Figures in brackets indicate revenue loss of all participating countries excluding Thailand and the Phillipines.

Weighted Average Percentage Reduction in Tariffs by Participating Countries

The final measure used by us to estimate the exchange of concessions is the contribution of each participating country to the weighted average reduction in regional tariff rate. The weighted average percentage reduction in the tariff rate of each participating country is obtained by observing the percentage tariff reduction in respect of each product, multiplying it by the share of the product in total imports of all negotiated products, and aggregating the value over all negotiated products. Algebraically, this may be expressed as follows :

$$TR_j = \sum_i 100 \times \frac{T_{ij} - T_{pij}}{T_{ij}} \cdot \frac{I_{ij}}{I_{nj}}$$

where TR_j is the weighted average percentage reduction in tariff rate of country j , T_{ij} and T_{pij} are the general and preferential tariff rates respectively on commodity i of country j ; I_{ij} is the value of imports of commodity i by country j , and I_{nj} is the value of total preferential imports of all negotiated products by country j .

The weighted average percentage reduction in tariff so measured is however an inadequate reflection of each country's contribution to regional reduction in the tariff rate. For this purpose, the weighted average percentage reduction in the tariff rate of each country is multiplied by appropriate regional weights which is the share of total imports of all negotiated products of each country to the total imports of negotiated products by all participating countries. Thus the regional weight RW_j of country j is defined as

$$RW_j = I_{nj}/I_{nr}$$

where I_{nj} is the total preferential imports of negotiated products of country j and I_{nr} is total preferential imports of negotiated products by all participating countries.

The weighted average percentage regional reduction in tariff, TRR , is given by :

$$TRR = \sum_j TRR_j, \text{ where } TRR_j = TR_j \cdot RW_j.$$

Now the contribution of each participating country to the regional reduction in tariff by all participating countries may be expressed in percentage terms as : $100 \times (TRR_j/TRR)$.

It may be seen from Table V that the weighted average percentage reduction in regional tariff rate comes to as much as 56 per cent. There is, however, great disparity in the percentage contribution to the reduction in the regional tariff rate by the participating countries. Thus it can be

seen that whereas Sri Lanka and Thailand contribute to it by as much as 56 per cent and 37 per cent respectively, India, Laos and Republic of Korea contribute to it by as little as 0.65 per cent, 0.90 per cent and 1.3 per cent respectively.

TABLE V

WEIGHTED AVERAGE PERCENTAGE REDUCTION IN REGIONAL TARIFF RATE OF ALL NEGOTIATED PRODUCTS AND PERCENTAGE CONTRIBUTION TO REDUCTION BY PARTICIPATING COUNTRIES

Country	Weighted Average Percentage Reduction in Tariffs (TR _j)	Regional Weights (RW _j)	Contribution to Regional Reduction in Tariff (%) (TRR _j)	Percentage Contribution to Regional Reduction in Tariff 100 × (TRR _j /TRR)
(1)	(2)	(3)	(4) = (2X3)	(5)
India	28.63	0.0129 (0.0149)	0.3693 (0.4266)	0.65 (0.84)
Sri Lanka	50.03	0.6247 (0.8483)	31.2537 (42.4404)	55.53 (83.47)
Bangladesh	28.18	0.0932 (0.1409)	2.6264 (3.9705)	4.67 (7.81)
Thailand	85.30	0.2439 (—)	20.8046 (—)	36.96 (—)
Laos	39.97	0.0127 (0.0986)	0.5076 (3.9410)	0.90 (7.75)
Republic of Korea	57.58	0.0126 (0.0012)	0.7255 (0.0691)	1.29 (0.14)
All Participating Countries	56.2872 (50.8477)	1.0000 (1.0000)	56.2872 (50.8477)	100.00 (100.00)

Note : These estimates are based on the value of imports in Calendar year 1974.

For explanation of terms and method of estimation, see text.

Figures in brackets indicate weighted average reduction in tariffs excluding Thailand. The Phillipines has not offered any tariff concessions under the Agreement and hence has been excluded in these estimates.

If Thailand is excluded from the Agreement, the regional reduction in tariff rate would be diminished to 51 per cent. Moreover, disparities in the contribution to regional reduction in tariffs by each participating country would be further accentuated. In such an event, Sri Lanka would be contributing as much as 83 per cent, and Bangladesh 8 per cent.

to regional reduction in tariff. On the other hand, the contribution of India and Laos would be 0.84 and 7.75 per cent respectively, while that of Republic of Korea would be reduced to negligible proportion.

V. IMPORTS OF NEGOTIATED PRODUCTS FROM PARTICIPATING AND NON- PARTICIPATING COUNTRIES

It may be interesting to examine the value and percentage share of imports of negotiated products from participating as well as from non-participating countries. This will give a rough idea of the maximum possible extent to which non-participating (mostly non-regional) sources of supply could be substituted by participating countries' (mostly regional) sources of supply through trade liberalisation. This is of course merely a theoretical possibility, for the actual substitution of foreign sources of supply by regional sources will depend upon a host of factors such as the prevalence of tied aid, multinational investment, the price elasticity of substitution between the participating and non-participating countries' products, the conditions of supply, and the effect of removal of quantitative restrictions. Moreover, the extent to which domestic output would be substituted by participating countries' supply is not known. In spite of these limitations, it may still be interesting to note how important the non-participating countries' sources of supply are in comparison to those from preferred sources. This gives some idea of the potentiality of substituting the former source by the latter, this being one of the objectives of intra-regional trade liberalisation.

In Table VI we have presented the value and percentage share of imports of negotiated products from participating and non-participating countries. It is seen that imports of negotiated products by all participating countries excluding Bangladesh forms only 6.1 per cent of imports of such products from all sources including both participating and non-participating countries.

Looking at individual participating countries, it may be noted that imports of negotiated products from participating countries is relatively more important in case of Thailand and Laos accounting for about 19 per cent and 9 per cent respectively of such imports from all sources. The share of Sri Lanka is 5.2 per cent, of the Phillipines that is 5.0 per cent, while that of Republic of Korea and India are merely 1.2 and 2.1 per cent respectively.

TABLE VI
THE VALUE AND PERCENTAGE SHARES OF IMPORTS OF NEGOTIATED PRODUCTS FROM PARTICIPATING AND NON-PARTICIPATING COUNTRIES : 1974 (VALUE IN THOUSAND US DOLLARS)^a

Countries	Value		Per Cent Share		Value ^b		Per Cent Share ^b	
	PC	NPC	PC	NPC	PC	NPC	PC	NPC
India	295	14008	2.06	97.94	174	14008	1.23	98.77
Sri Lanka	20487	37662	3.15	94.85	16745	377662	4.24	95.76
Thailand	8810	36751	19.33	80.66	—	—	—	—
Philippines	509	9719	4.98	95.02	—	—	—	—
Laos	247	2607	8.65	91.35	14	2607	0.27	99.83
Republic of Korea	387	30975	1.23	98.77	8	30975	0.03	99.97
All Participating Countries	30735	471722	6.12	93.88	16941	425252	3.83	96.17

Source : National Trade publications of participating countries.

Notes : These percentage shares are expressed as proportions of imports from all sources.

^a This excludes Bangladesh as the value of its imports of negotiated products from non-participating countries is not available. The value of imports of products obtained from partner country export data has also been excluded as in such cases it is not possible to obtain the same data relating to Bangladesh's imports from non-participating countries.

^b These values are also exclusive of Thailand and the Philippines.

If Thailand and the Phillipines are excluded from the preferential arrangement, the share of imports of negotiated products among the remaining participating countries is reduced to merely 3.8 per cent. The shares of Laos and Republic of Korea show considerable decline. This is because, as we have noticed earlier, the concessional imports offered by Laos and Republic of Korea were primarily in favour of Thailand.

VI. POSSIBLE ADDITIONAL CONCESSIONS

We have observed that to a large extent imbalances in the exchange of concessions under the Bangkok Agreement has arisen primarily due to imbalances in the exchanges of India and Republic of Korea with Sri Lanka and Bangladesh. In this context some urgent consideration need to be given to the possibility of moderating these imbalances through additional non-reciprocal concessions by India and Republic of Korea to Bangladesh and Sri Lanka. These may be offered on the basis of (i) existing trade in selected products between these countries, or (ii) in respect of some potential exportables of the concession receiving countries. The criteria for selecting products in the latter case would be (a) substantial import requirements of the concession offering country and (b) considerable export surplus of the concession receiving country. In case of (b), sizeable exports to non-participating countries may be taken note of.

On the basis of criteria mentioned above, we have presented in Table VII a list of products in respect of which India has sizeable import and Sri Lanka has sizeable exports, although this trade is mainly with non-participating countries. The products in this category are glycerine, primary batteries, accumulators, and leather of bovine cattle.

In Table VIII, we have presented a list of products in respect of which India may offer additional concessions to Bangladesh. The products covered in this list include "fish fresh", "other newsprint", "yarn and thread of synthetic fibres" "synthetic fibre and yarn waste", and "glycerine-crude, refined and pharmaceutical". India could also offer a few concessions in respect of selected "organic compounds" or chemicals.

In Table IX, we have presented a list of products in respect of which Republic of Korea may grant additional concessions to Sri Lanka.

Trade statistics for the calendar year 1974 revealed that the Republic of Korea imported practically nothing from Bangladesh reflecting thereby the very limited possibility of the former country offering the latter further concessions on the basis of existing trade flows.

TABLE VII
POSSIBLE ADDITIONAL CONCESSIONS BY INDIA TO SRI LANKA

Sl. No.	Product Code	Product Description	Value of Indian Imports (\$ 1974)		Value of Sri Lanka Exports (\$ 1974)	
			From Sri Lanka	From other Countries	To India	To other Countries
1.	51122601 — 03 (15.11)	Glycerine-crude, refined, and pharmaceutical (Glycerol and glycerol lyes)	—	556541	—	220120
2.	7291102 (85.03)	Primary batteries (Primary cells and Primary batteries)	—	498667	—	34585
3.	7291109 (85.04)	Accumulator-Others (Electric Accumulators)	2952	167326	—	68259
4.	6114011 (41.02)	Leather of other bovine cattle: chrome tanned split (Bovine cattle leather-except those falling under 41.06, 41.07, 41.08)	9770	56781	—	507947
5.	5129900	Other organic compounds	2020	25892488	n. a.	n. a.

Source : i) *Monthly Foreign Trade Statistics of India*, January-March 1974, and December 1974.
ii) *Sri Lanka Customs Return*, December 1974.

Note : India's import data is given in RITC code, while those corresponding to Sri Lanka's exports, presented in brackets, is given in BTN code.

TABLE VIII
POSSIBLE ADDITIONAL CONCESSIONS BY INDIA TO BANGLADESH

Sl. No.	Commodity Code	Product Description	Value of Indian Imports (\$ 1974)		Value of Bangladesh Exports (\$ 1974)	
			From Bangladesh	From other Countries	To India	To other Countries
1.	0311001	Fish fresh Chilled or Frozen : Hilsa fish (fresh)	1991738 ^a	—	63037 ^a	2379178
2.	6441009	Other Newsprint (Newsprint)	748284	35506000	1099570	4653772
3.	6316409	Yarn and Thread of Synthetic Fibres : Other Yarn Discontinuous not for Retail Sale	11323	427655	n. a.	n. a.
4.	2664002	Synthetic Fibre and Yarn Wastes	24020	124655	n. a.	n. a.
5.	2664002	Regenerated fibre and Yarn Waste	17567	—	n. a.	n. a.
6.	5122601	Glycerine Crude	2283	122513	n. a.	n. a.
7.	5122601	Glycerine Refined	20940	195836	n. a.	n. a.
8.	5123603	Glycerine Pharmaceutical Grade	10973	300323	n. a.	n. a.
9.	5129906	Other Organic Compounds	112905 ^a	31175379	201767 ^a	134790

Sources : (i) *Monthly Foreign Trade Statistics of India*, January-March 1974, and December 1974.

(ii) *Export Receipts*, 1974/75, Statistics Department, Bangladesh Bank.

Notes : (i) Indian import data is based on RITC code.

(ii) The Bangladesh Bank publication, *Export Receipts* does not present any commodity code but only commodity description by broad commodity groups.

^a Considerable discrepancy between the two figures is partly due to lack of identical product comparison, reporting errors, and partly because the period covered by Indian exports and Bangladesh imports are not identical.

TABLE IX

POSSIBLE ADDITIONAL CONCESSIONS BY REPUBLIC OF KOREA TO SRI LANKA

Sl. No.	Commodity Code	Product Description	Value of Korean Imports (\$ 1974)		Value of Sri Lanka Exports (\$ 1974)	
			From Sri Lanka	From other Countries	To South Korea	To other Countries
1.	5704.60	Palm Fibres	42036	107173	n. a.	n. a.
2.	5704.90	Vegetable textile fibres n. e. s.	1725 ^a	5416	6790 ^a	6680090
	(57.04 B)	(Other vegetable textile fibres, wastes of such fibre)				
3.	5704.10	Sisal, including waste	2840	614001	n. a.	n. a.
4.	1403.00	Vegetable materials used primarily in brushes or in brooms	4027	33343	n. a	6395
	14.03A	(Product Description as above)				
5.	0509.39	Horn of deer n. e. s.	2436	468815	n. a.	55900
	(05.09)	(Horns antlers, hooves, nails, claws, and beaks of animals, whalebone, etc.)				

Sources : i) *Yearbook of Foreign Trade Statistics*, 1974, Korean Traders Association.

ii) *Sri Lanka Customs Returns*, December, 1974

Note : BTN Codes and product description in brackets are those obtained from *Sri Lanka Customs Returns*.

^a These values differ owing to lack of correspondence in product coverage and reporting inaccuracies.

It is evident that in general the range of products in respect of which both India and Republic of Korea may offer additional concessions to the less developed member countries is extremely limited. It is thus suggested here that to start with, both these countries should maximize the depth of their tariff cuts in respect of negotiated products in favour of Sri Lanka and Bangladesh, possibly eliminating them in a phased manner. In view of their earlier industrialisation, such a step is unlikely to adversely affect their domestic industries. Moreover the Agreement provides for adequate safeguard clauses to permit the two countries to take this initiative.

Another point which must be taken note of is the restrictiveness of non-tariff barriers on trade flows. In developing countries characterized by import controls, this factor will probably be more important in regulating trade flows than tariff barriers. Here too the initiative for dismantling of non-tariff barriers on trade in respect of negotiated products must come from India and Republic of Korea. It must be noted that India is already importing quite a number of products of export interest to Bangladesh free of duty. Some illustrations of products in this category are newsprint, urea, fish (fresh or frozen), and raw jute. Some of these products have been listed in Table VIII in which possible additional concessions which India may offer Bangladesh have been indicated. Hence in case of such products India's concessions would have to be in the nature of removal of non-tariff barriers and an assurance that some standstill arrangement with respect to duties would operate in favour of imports of such products from Bangladesh.

Finally what is in fact required is the creation of new trading opportunities on the basis of industrial complementation agreements or joint industrial ventures between the relatively developed countries and the less developed ones. The export surpluses so generated in the latter countries could be used for absorption in the former countries. Such a course is open under article 12 of the Bangkok Agreement. Given the recent improvements in the foreign exchange reserves of both India and Republic of Korea, and the recent liberalisation of policies towards foreign investment in Sri Lanka and Bangladesh, the aforementioned proposals appear to be quite feasible.

VII. CONCLUDING OBSERVATIONS

1) Our analysis on the basis of trade flows in respect of negotiated products for the calendar year 1974 reveals that imbalances in the exchange of concessions is likely to emerge if the provisions of the Bangkok Agreement are implemented. The imbalances would be particularly marked between the more developed participants (India and Republic of Korea) and the less developed ones (Sri Lanka and Bangladesh).

2) The imbalances referred to above get further exacerbated when and if some of the original signatories to the Agreement (Thailand and the Phillipines) withdraw from it.

3) Since the range of products in respect of which the relatively developed countries may offer further concessions appears to be limited, it is suggested that to start with, these countries could maximize the depth of tariff cuts, or eliminate tariff in respect of their list of concessional imports.

4) The initiative for the removal of non-tariff barriers on trade in negotiated products should come from the relatively more developed member countries.

5) The creation of new trading opportunities through joint industrial ventures as provided for under article 12 of the Bangkok Agreement, deserves urgent consideration.

It is admitted that the present study on which the aforementioned guidelines have been framed is of an exploratory nature. It is based on only one year's trade flows, that of calendar year 1974. Moreover, the analysis is a static one, based on existing trade flows rather than on the dynamic aspect of potential trade flows. The latter aspect would have to be related to the possibility of substituting domestic supplies and imports from the non-participating countries by those of member countries. This again depends upon the effectiveness of income, tariffs, relative prices, and non-tariff barriers in the determination of trade flows. The inadequacy of all pertinent data related to the above, however, prevents us from extending this analysis further at the present stage.

Post Script

It is heartening to note that efforts are now being made under the Bangkok Agreement for the rectification of imbalances referred to above. An official Indian team returned from Dacca on 29 April 1978 after the conclusion of bilateral negotiations with the Bangladesh government under the Agreement. At the request of Bangladesh, India agreed to remove "synthetic organic dyestuff" from the reciprocal preferential list between the countries and substitute it by "unmanufactured tobacco", an item in which Bangladesh has been a regular importer from India during the last few years. Further, India has agreed to eliminate completely import duty on molasses from Bangladesh, an item of considerable export interest to Bangladesh. In view to Bangladesh's position as a least developed one among the developing countries, India has given a ten percentage point preference on a non-reciprocal basis to Bangladesh on the latter's seven

leading items of export to India, namely, newsprint, urea for manure, fish (fresh and frozen), fish (smoked or dried), mechanical woodpulp for the manufacture of newsprint, raw jute and viscose filament yarn. The effective rate of duty for the import of these items to India at the moment is negligible. India has given a non-reciprocal preference on these items in the form of an assurance of ten percentage point reduction of duty in the event of these items becoming dutiable.⁵ These concessions are in the right direction and along the lines suggested by us. It is hoped that similar negotiations between India and Sri Lanka would soon be made for the rectification of imbalances in the exchange of concessions between the two countries. It is hoped further that the Republic of Korea would also provide additional concessions to Bangladesh and Sri Lanka for the rectification of similar imbalances with these countries.

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⁵ See [1].

Prevalence of Dietary Inadequacy in Energy and Protein Intake in Rural Bangladesh

by

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I. INTRODUCTION

Incidence of malnutrition is a major national problem in Bangladesh. Like other Asian countries, part of the malnutrition problem is due to insufficient energy and protein intake by the population. In the 1962-64 National Nutrition Survey, for example, the prevalence of households with deficient energy and protein consumption was noted to be 45 per cent and 60 per cent, respectively [12]. These levels were estimated by comparing measured household food intake with requirements as computed from internationally accepted guidelines [2 ; 3].

These are no doubt very low levels of nutrient intake. But apart from absolute levels of intake, the relative importance of energy versus protein content of a diet is also of significant policy relevance. A priority focus on proteins implies the costly development of new and more protein sources for the average diet. But should such a deficiency be of less significance, policies and programmes may be directed more efficiently at agricultural and food programmes which would increase the energy content of the diet.

In the context of Bangladesh, it was indeed found by Hussain [6] on the basis of the 1962-64 Survey [12] that more than half of the observed protein deficiency was consequential of concomitant energy deficiency.

The objective of the present study is to assess afresh the relative importance of these two macronutrients in the Bangladesh diet on the basis of recently collected data from the National Nutrition Survey of Rural Bangladesh [9].

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II. DATA AND RESULTS

During the period from January to August 1976, dietary intake of 615 randomly selected households in 12 sampled villages of Bangladesh were recorded.¹

Household intake of food was converted into per capita intakes and protein and energy values were calculated. For conversion of food into nutrients, the Table of Nutritive Value of Indian Foods [8] has been used.

In order to compare observed intake with requirements for each specific household, the daily per capita energy and protein requirements for Bangladesh have been calculated on the basis of recommendations of the 1973 WHO/FAO Expert Committee on energy and protein requirement [5].²

The average daily per capita intake of energy and proteins in the 615 rural households as well as their requirements are presented in Table I. The average intake of nutrients is found to be 2,094 calories (or 8.76 megajoules) and 58.5 gms of protein per capita per day. In comparison to requirements, there appears to be a net energy deficit of 154 Kcal per capita daily in rural Bangladesh. This contrasts markedly with protein where intake was 13.2 gms higher than the recommended safe level of intake. Expressed as percentages, the energy deficit was 6.8%, in contrast to a protein surplus of 29.1%.

Average intake values however may conceal more than they reveal. Inter-household distribution of nutrients is known to be skewed ; thus aggregate values are likely to obscure the number of households experiencing deficit or surplus consumption levels. Table II presenting an estimation of energy and protein requirements by age and sex in rural Bangladesh was therefore constructed. Individualized requirement data are necessary to enable household intake to be compared with household requirement for each individual household separately. Such a comparison would permit classification of each household as deficit or surplus according to its size, age-sex composition, and actual household intake.

¹For details of sampling procedure and method of recording food intake, see [9].

²For detailed procedure of adjusting WHO/FAO recommendation for the specific conditions of Bangladesh. see [9].

TABLE I

**AVERAGE PER HEAD DIETARY ENERGY AND PROTEIN
INTAKE IN RURAL BANGLADESH HOUSEHOLDS 1975/76**

	Energy		Protein
	(in Kcal)	(in MJ)	(in gms)
Intake	2094	8.76	58.5
Requirements	2248	9.41	45.3
Deficit/Surplus	-158	-0.66	+13.2
% Requirement	93.2	93.20	129.1

TABLE II

**CRITERIA USED FOR CALCULATING PER HEAD PER DAY ENERGY
REQUIREMENTS AND SAFE LEVEL OF PROTEIN
INTAKE ON HOUSEHOLD BASIS**

Age Group	Calculated Energy Requirement Kcal (MJ)			Calculated Safe Level of Protein Intake (gm)		
	(male)	(both sexes)	(female)	(male)	(both sexes)	(female)
Below 1 yr.		820(3.43)			28.3	
1-3 yrs.		1360(5.69)			26.5	
4-6 yrs.		1830(7.66)			34.0	
7-9 yrs.		2190(9.16)			41.2	
10-12 yrs.	2600(10.88)		2350(9.83)	49.8		48.2
13-15 yrs.	2753(11.52)		2224(9.31)	43.6		40.3
16-19 yrs.	3040(12.72)		2066(8.64)	52.7		43.4
20-39 yrs.	3122(13.06)		1988(8.32)	5.86		
40-49 yrs.	2831(11.48)		1870(7.82)			
50-59 yrs.	2554(10.69)		1771(7.41)			42.6
60-69 yrs.	2270 (9.50)		1574(6.59)			
70 yrs. +	1987 (8.31)		1378(5.77)			
Additional for			285(1.19)			9.2
Pregnancy			550(2.30)			28.3
Lactation						

Note: Figures in parentheses are Megajoules of energy.

Figure 1 plots the distribution of households according to intake of safe level of protein and intake of energy sufficient to meet requirements. The data show that 59.4% of rural households were energy deficient,

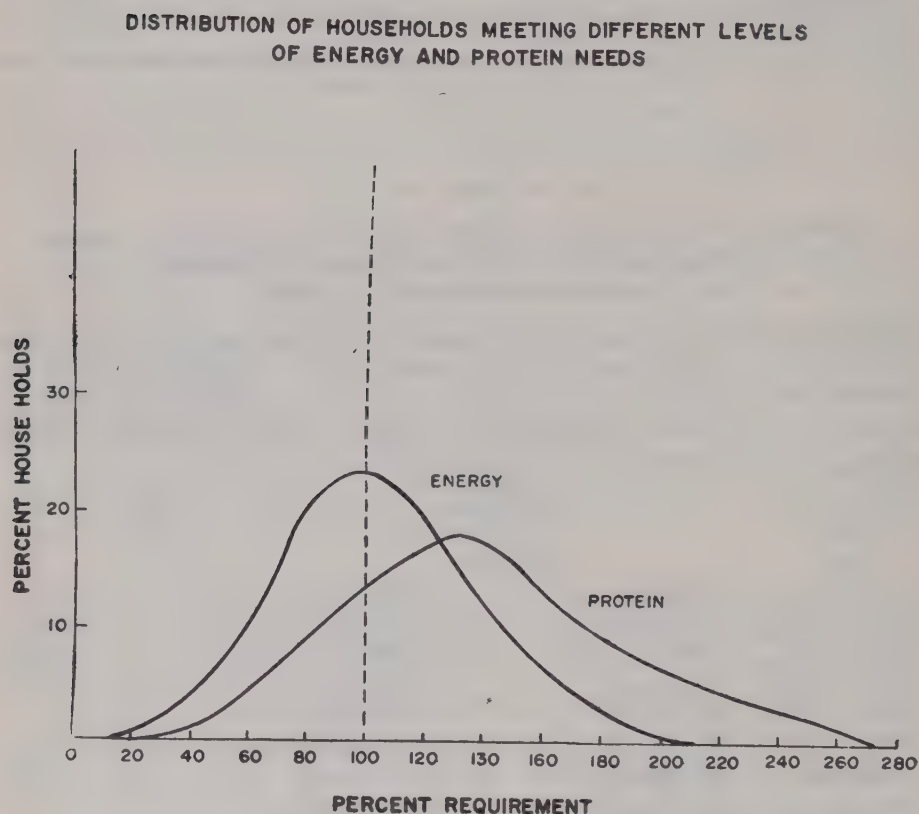


Figure 1

with a decreasing proportion of families being amongst the severely deficient. In contrast to energy, only 28.9% of households were consuming less than the "safe level" of protein.

Figure 2 plots the cumulative distribution of energy and protein intake according to per cent of energy requirements and safe level of protein respectively. The more pronounced energy deficiency is again evident here.

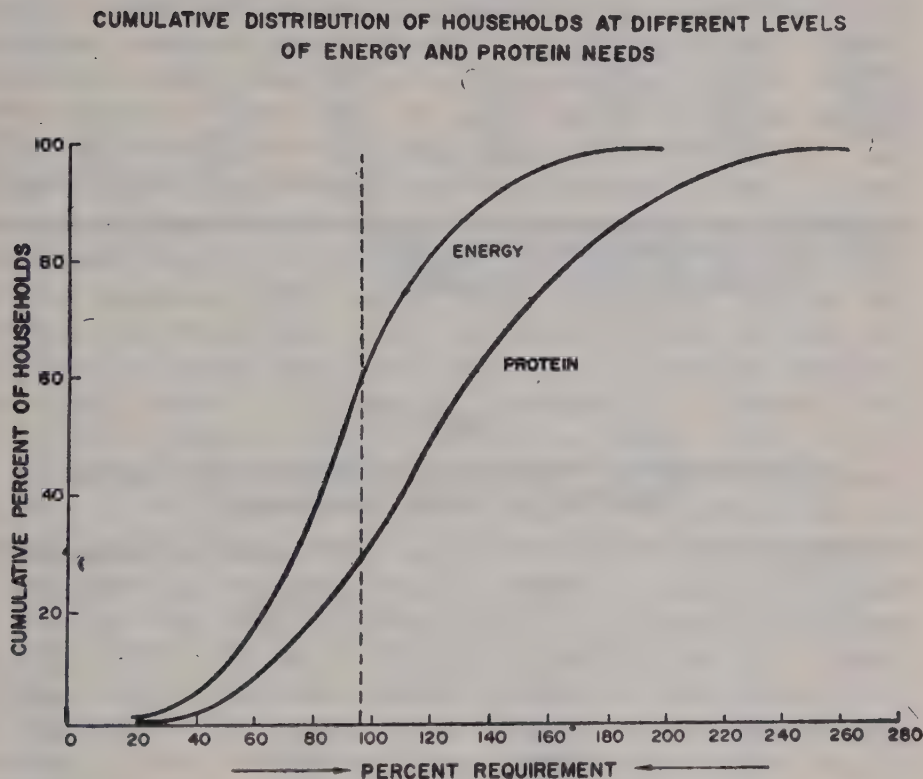


Figure 2

With regard to protein, its effective utilization is known to be dependent upon energy adequacy. If energy requirements are not met, dietary protein may be utilized for energy purposes. Table III presents a bivariate distribution of households according to varying levels of protein and energy intake. The bivariate distribution shows a gradation of households with respect to

TABLE III

**BIVARIATE DISTRIBUTION OF 615 RURAL BANGLADESHI HOUSEHOLDS
BY PER CENT OF PROTEIN AND ENERGY INTAKE OF
REQUIREMENTS OR SAFE LEVELS**

A B	< 60	60-69	70-79	80-89	90-99	100 >	Total
60	6.2	0.2	—	—	—	—	6.3
60-69	3.4	—	—	—	—	—	3.4
70-79	2.9	2.3	1.1	0.2	—	—	6.5
80-89	2.3	2.0	1.5	0.2	0.3	—	6.2
90-99	0.5	2.1	2.9	0.3	0.5	0.2	6.5
100	0.2	1.3	6.8	10.2	12.0	40.5	71.1
Total	15.4	7.8	12.4	10.9	12.8	40.7	100.0

Note : A→Per cent Requirement of energy intake

B→Per cent safe level of protein intake,

TABLE IV

**CLASSIFICATION OF PREVALENCE OF ENERGY AND PROTEIN
DEFICIENCY IN RURAL BANGLADESH**

Protein Energy	Normal	Protein Deficiency	All
Normal	40.5 (249)	0.2 (1)	40.6 (250)
Energy Deficiency	30.6 (188)	28.8 (177)	59.4 (365)
All	71.1 (437)	29.0 (178)	100.0 (615)

energy and protein intakes. Table IV summarizes the bivariate distribution according to both energy and protein deficiency. The table shows that protein deficiency *per se* is present in 29.0% of the households. More than 99 per cent of these protein deficient households (constituting 28.8% of all the households studies), however, are also deficient in energy. Out of a total of 615 households studied only one household, constituting a minute fraction of the total (0.2%), was found to be sufficient in energy but deficient in protein. Another 30.6% of the households are not deficient in protein *per se* but deficient in energy. In these households

protein deficiency is conditioned by inadequate energy intake. The total prevalence of protein deficiency can thus be projected to increase from 29.0% to 59.5%. This level is very close to the total prevalence of energy deficiency of 59.4%. Similar findings were reported by other workers [6 ; 7 ; 10 ; 11] in other South Asian countries.

III. DISCUSSION

It is evident from the foregoing presentation that energy deficiency is of primary concern in rural Bangladesh. Table IV clearly shows that the magnitude of energy deficiency is more than twice as much as that of protein deficiency. Almost half the energy deficient households are also deficient in protein. There is a sheer scarcity of food in this group of households which are deficient in both energy and protein.

Another group of energy deficient households which are apparently not deficient in protein *per se* constitute more than half the total energy deficient households (30.67% out of 59.4%). Average per head per day protein intake of this group would be adequate to meet the calculated safe level of protein intake had there been no energy deficiency. Since energy intake of this group of households is inadequate, part of the protein ingested would be utilized to provide energy. Efforts to increase protein supply to this group is an inefficient way to improve the diet. If energy needs of this group can be met, protein may be expected to take care of itself.

Households that are not deficient in energy but deficient in protein are extremely rare. Only a minute fraction of households falls in this category (0.2%). The diet of this group is likely to be heavily dependent on starchy roots. But starchy roots other than potatoes are not consumed in bulk in Bangladesh. Only in extreme poverty sweet potatoes, in season, replace the staple cereal in diet. This explains why few frank cases of kwashiorkor and other clinical signs associated with protein deficiency was seen during the recent nutrition survey of rural Bangladesh [9]. On the other hand, protein deficiency conditioned by energy deficiency is likely to cause loss of body mass and growth retardation. Widespread growth retardation as identified by the nutrition survey of rural Bangladesh [9]³ is quite understandable from the above analysis of the prevalence of protein-energy deficiency.

³ Anthropometric examinations revealed that four out of five children below 5 years of age are either underweight or stunted.

Poverty and low purchasing power are perhaps the biggest constraints affecting the food intake of poor households. A vast majority of households are living below poverty line and are thus unable to fulfill their basic needs [1]. Widespread prevalence of protein-energy deficiency in rural Bangladesh is likely to be more common in these households living below poverty line. The solution of the problem, therefore, lies in an increase of total food production leading to energy sufficiency, and simultaneously increasing the purchasing power of low-income households through the creation of employment generating activities and taking other measures that will remove disparity.

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Factors Affecting the Use of Fertilizers in Bangladesh

by

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I

Although the issue of fertilizers is brought up frequently in the context of agrarian structure, foodgrain production, productive efficiency etc., no comprehensive study has yet been made on the factors affecting the use of fertilizers in Bangladesh. This note attempts to collect all available data, case studies, different reports and records and tries to integrate the relevant findings to throw some light on this important issue. It should be borne in mind, however, that the available statistics being far short of adequate and based on micro-level studies, our conclusion should be treated as tentative rather than definitive.

One may hypothesize on *a priori* grounds that the use of fertilizers will be positively related to its profitability on the one hand and purchasing power of the farmers on the other. Profitability in turn may depend on a number of factors viz., (a) type of crops grown, (b) availability of irrigation water, (c) tenurial arrangements etc. We shall try to explore in what follows, on the basis of whatever fragmentary evidence one can marshal, the degree of influence these factors exert on the use of fertilizers in Bangladesh.

II

Type of Crops

Comprehensive statistics on crop-wise use of fertilizers is not available as no such record is maintained at the field level. Analysis will be made on the basis of case studies and different reports. A recent study by Ahmed [2] indicates that use of fertilizers on paddy has increased over

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the years (Table I). The rate of increase is more on *Boro* Paddy than on either *Aus* or *Aman*. This is explained by the fact that HYV variety of paddy which is highly responsive to fertilizers and resistant to lodging is grown more widely than other varieties in the *Boro* season. The recent survey of the Agro-Economic Research also shows higher dose of application on Local/HYV *Boro* and Potato (Table II).

TABLE I
LEVEL OF FERTILIZER USE ON PADDY IN BANGLADESH
(Nutrient lbs. per acre)

Period	Aus	Aman	Boro
Average of 1961-65	2.81	1.66	9.86
Average of 1966-70	5.65	4.82	24.32
Average of 1971-74	8.19	6.20	44.13

Source: Ahmed [2].

Variation in use of fertilizers on different crops can in principle be explained in terms of marginal productivity. But no such study is available except some rough estimate made by Ahmed [2]. He shows that fertilizer use results in different rates of profitability for different types of paddy; for instance, he observes that value of marginal product of paddy ranges from Tk. 228.75 on *Boro* to Tk. 247.50 on *Aus* when paddy was priced at Tk. 75 per maund. Incidence of different levels of achievements due to fertilizer application has also been shown by Badruddoza [4] in terms of physical yield over the unfertilized or controlled field. He has shown that the value of incremental production of paddy far exceeds the cost of fertilizers. He shows that under equal treatment the additional increment of yield on local *Boro* is less than that of the local *Aus* and *Aman*. Increment of HYV paddy is quite high but recommended rate of fertilizers in its case is also very high.

Irrigation

No detailed study has been made on the impact of irrigation on fertilizer use. One can, however, get some indication of this impact from HYV coverage which has increased following the expansion of irrigation. HYV coverage can, therefore, be treated as a proxy of irrigated area in the analysis. We have found that there is a significant positive relation between the HYV acreage and the per acre application of fertilizer. This conclusion is based on the time series data for the period 1968/69 to

TABLE II

PER ACRE APPLICATION OF FERTILIZERS IN BANGLADESH IN 1976/77 ON DIFFERENT CROPS

(in lbs)

	Aus		Aman		Boro		Wheat		Sugar- cane	Potato	Tobacco	Jute
	Local	HYV	Local	HYV	Local	HYV	Local	HYV				
Urea	14.0	83.7	15.2	101.8	17.7	118.4	7.4	33.1	49.0	145.6	47.6	32.2
TSP	3.2	38.0	3.2	40.6	5.2	51.6	10.9	28.6	13.9	150.3	31.3	7.4
MP	0.3	6.6	0.4	7.6	0.2	7.0	0.5	11.1	6.8	22.5	16.8	4.0
Total	17.5	128.3	18.8	150.0	23.1	177.0	18.8	82.8	69.7	318.4	95.4	43.6

Source : Agro-economic Research [1].

1975/76 where 'r' has the value of 0.76 and the cross-section data of 1975/76 on the relation between the proportion of HYV area to total rice cropped acreage and the per acre use of fertilizers, where 'r' is estimated as 0.77. Another study by Alam [1] also shows that with the availability of irrigation water, consumption of fertilizers has increased.

Tenurial System

In addition to the factors discussed above, tenurial system may also affect the fertilizer use. Generally in the owned field greater quantity of fertilizers is expected to be applied than in the rented-in land from where landowners share the produce without bearing any cost of fertilizer. Such a tenurial system is expected to discourage the tenants in fertilizer application. That situation may, however, improve if landowners share the costs along with sharing of the produce as is the practice in some parts of the country. Such detailed statistics are, however, not available, but results of some case studies may throw some light in this respect.

The case study by Hossain [6] shows that the tenants (including those who have some rented-in land besides their own) in Thakurgaon with a farm size of less than 2.0 acres use higher amount of fertilizers than owners. But tenants of all other size groups use either equal or lower amount. In Phulpur, owners are generally found to use higher quantity fertilizers than the tenants except in the size group of 5.0 to 7.5 acres (Table III).

TABLE III

FERTILIZER APPLICATION ACCORDING TO SIZE OF FARM (in lbs)

Farm Size (acres)	Phulpur		Thakurgaon	
	Owner	Tenant ⁺	Owner	Tenant ⁺
Upto 2.0	81.1	67.0	11.0	16.0
2.0 to 3.5	101.0	74.0	26.0	26.0
3.5 to 5.0	95.0	53.0	44.0	44.0
5.0 to 7.5	77.0	106.0	80.0	36.0
Over 7.5	68.0	No farm	69.0	44.0
All Farms	88.8	68.5	40.3	38.5

Source: Hossain [6];

⁺ Tenant here includes both owner-cum-tenants and pure tenants.

It indicates that owner farmers are applying more fertilizers as expected. But as these estimates do not show what type of cropping pattern they followed and what proportion of total farm area is rented-in land, they do not reveal correct position. That aspect may be clear to some extent from another case study by Jabbar [7], although his observations again being based on micro-level data cannot be treated as conclusive. In his study, the part-tenants of Rangpur (who have 51% of total cultivated area on rent) use higher amount only on *Boro*, but their average rate of application is lower. In the Dinajpur area, part-tenants (41% of land taken on rent) and pure tenants (100% of land taken on rent) on average apply higher dose of fertilizers compared to the owners and part operators (Table IV). Crop-wise figures show that in case of sugarcane, tenants and part tenants there use more fertilizers than owners, but they use less in case of *Boro* and wheat. It is, therefore, not yet clear whether tenancy has any adverse effect on fertilizer application. In fact, one is left with the puzzling result that in some cases at least, tenants appear to be using more or at least no less fertilizers than owners. It is not easy to explain this result, but one possibility is that because of serious competition for land and for their survival they use fertilizers at the dictates of landowners although the cost is borne fully by themselves.

TABLE IV

AMOUNT OF FERTILIZERS APPLIED PER ACRE BY TENURE CLASS
FOR THE SELECTED REGIONS OF BANGLADESH

(in lbs)

Tenure Class	Rangpur				Dinajpur			All Crops
	% of Area Cultivated	Boro	Tobacco	All Crops	% of Area Cultivated	Sugarcane	Boro & Wheat	
Part-operators	18.0	131.65	311.02	55.13	53.60	190.07	164.56	67.47
Owner-operators	48.2	169.50	279.75	52.66	18.40	270.70	167.03	50.19
Part-tenants	33.8	177.79	252.60	46.90	23.20	280.80	124.74	73.23
Tenants	b	b	b	b	4.90	286.33	132.47	87.22
All Farms		160.44	277.78	51.01		223.80	157.15	65.00

Source : Jabbar [7].

b. Not available.

TABLE V
PER ACRE APPLICATION OF FERTILIZERS IN DIFFERENT CROPS IN THREE DIFFERENT STUDY AREAS**

Farm Size (acre)	Local Aus			Local Transplanted Aman			Local Boro			(In seers)		
	Brahman- baria		Phulpur	Thakur- gaon		Brahman- baria	Phulpur		Brahman- baria	Phulpur		Thakur- gaon
< 2.5 acres	32.88	6.78	5.00	31.69	18.08	0	5.92	48.52	9.51	6.75	0	0
2.5 to 5.0	24.26	12.91	6.00	15.23	18.12	5.33	8.71	54.18	12.55	12.40	0	0
5.0 and Above	21.78	11.60	11.71	32.93	12.30	81.10	23.73	44.48	19.35	11.77	6.35	6.35
Total	26.12	11.28	9.10	27.14	15.44	15.26	15.37	48.12	15.83	11.30	6.35	6.35

(Contd.)

	IRRI-8 (Boro)		IRRI-Aus		IRRI-Aman	
	B.Baria		Phulpur		Thakurgaon	
	124.60	59.60	26.32	Not cultivated	54.87	Not cultivated
	139.27	59.73	70.14	120.00	54.12	Not cultivated
	122.53	134.00	157.90	80.10	66.48	91.20
Total	127.98	111.14	121.71	81.86	58.87	91.20

Source: Bangladesh Institute of Development Studies

Note: Per acre application is based on the cultivated area

*One seer is equivalent to 2.05 lbs.

**Based on the survey data for the years 1973/74.

Purchasing Power

Lack of purchasing power is generally considered to be one of the important constraints on the fertilizer use for the poor farmers who generally have farms of small size. In this country farm size is the main determinant of purchasing power, and therefore farm size is considered here to be its proxy.

But different case studies undertaken by the Bangladesh Institute of Development Studies (BIDS) show that farm size does not have much effect on the application of fertilizers (Table V). But in another survey of the BIDS covering twelve villages of Bangladesh in the year 1975 it has been found that small farmers use more fertilizers on both local *Aman* and HYV *Aman* (Table VI) compared to medium and large farmers. This may be due to the fact that these estimates are based on cultivated area instead of actually fertilized area and big farmers may not fertilize all their crop fields or even if they do, rates may be different depending on the topography, soil characteristics and the type of crops grown. The small farmers on the other hand, because of economic pressure, practise intensive cropping and use fertilizers as much as possible in spite of their hardship. For that they may arrange money either from non-institutional loan or otherwise. Another possibility is that in the irrigated block, the proportion of irrigated area (where mainly HYV is grown) to their total cultivated acreage is higher for the small size farm. Such finding has already been noted by Hossain [5] in his Phulpur case study.

TABLE VI

PER ACRE APPLICATION OF FERTILIZERS ON LOCAL AND HYV AMAN PADDY+

(in seers)

Farm Size	Local Aman				Hyv Aman			
	Urea	TSP	MP	Total	Urea	TSP	MP	Total
≤ 2.0 acres	5.34	1.48	0.85	7.66	31.60	22.06	11.37	65.02
2 to ≤ 5.0	2.39	0.82	0.43	3.65	37.25	20.84	8.21	56.31
5 Acres and Above	1.98	0.65	0.37	3.70	24.68	24.16	6.32	55.20
	2.45	0.80	0.44	3.70	26.60	22.36	7.72	56.68

Source: BIDS survey undertaken in the year 1975.

+Data of twelve villages and the application is estimated on the basis of area cultivated under the crop.

III

CONCLUSION

Fertilizer use is mainly dependent on the crops grown and their productivity. Farm size does not seem to have much effect on the use of fertilizers even under unfavourable tenurial system because of serious crisis of land. This aspect, however, needs more careful study.

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Psychological and Socio-Cultural Factors as Related to Attitudes Towards Family Planning among Women in Bangladesh

by

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AND

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I. INTRODUCTION

In arresting the galloping rate of our population growth large amount of money has been spent since 1960, when for the first time a regular programme of family planning was undertaken by the government. Since then many national and international organisations have also been working in this field. Most of the activities of such organizations are service-oriented programmes which are primarily, launched out of the conviction that there exists a "latent demand" for family planning services. But how far such a latent demand exists in our society is questionable. Data collected by the National Impact Survey of Pakistan in 1968 showed that only 6.5% of the urban married couples and 3.6% of the rural married couples under 50 years of age of erstwhile East Pakistan (now Bangladesh) were using contraception [13]. The study conducted by Stoeckel and Chowdhury [15] showed that despite 6 years of publicity in the Kotwali thana of the district of Comilla, only 4% of the married fertile couples were found to practice any contraception. When we focus attention on the trend of our population growth, it becomes clear that no significant reduction has taken place in the rate of birth per annum—the crude birth in 1965 was 50 (approximately) per thousand, and still in 1977 it was approximately the same [11].

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So the question arises as to what success is achieved by spending millions of taka in family planning programmes? It is obvious that the existing family planning programme needs some change or at least needs some assistance from other ingenious programmes so that a favourable attitude towards family planning can be created and an internal demand for it can be accelerated. Therefore, the first task is to recognise those variables which can break down the resistance towards family planning and facilitate the development of favourable attitude towards it.

In the following section we put forward some hypotheses regarding the factors affecting attitude towards family planning; the next two sections make an attempt to test those hypotheses in the context of Bangladesh, and some concluding observations are made in the final section.

II. FACTORS DETERMINING ATTITUDE TOWARDS FAMILY PLANNING

Six possible variables which could influence development of attitude towards family planning among Bangladeshi women were examined by the present study. The investigated psychological variables were (i) sex role perception (ii) decision making behaviour and (iii) independence training in childhood. The socio-cultural variables were (i) educational level (ii) family income level and (iii) rural-urban background. We shall discuss in the rest of the section the manner in which these different variables may affect people's attitude towards family planning.

The Psychological Factors

In what manner men or a women behave in a society depend considerably on how they perceive their sex roles. 'Sex-role' refers to the expectation of the society as regards what role a female or a male should play. Traditionally in our society, attitude related to "feminine role" involves positive feelings for being lovable, getting married, being an obedient housewife, raising children, being a loving mother and submissively doing all the household work, etc. Various studies have shown that women who deviated from the "traditionals" in their sex-role perception were better adjusted in colleges, had higher ambition in life, were higher in achievement motivation and had higher educational aspiration [12; 17; 16; 10]. We can thus assume that the women who possess a traditional sex-role perception, will develop seclusion and

passivity in life and thus will not realise the importance of family planning. On the other hand, those who develop a contemporary or liberal sex role perception will become active in life and will develop favourable attitude towards family planning.

A number of studies on decision making behaviour (i.e., the extent of one's participation in the happenings of life) reveal that pattern of initiative in the activities of life is an important factor in the context of one's fertility regulation [4]. Chaudhury [3] found that working and non-working women significantly differ in their fertility, at least in the lower levels of education. Berelson [1] and Jaffe and Azmi [8] have shown that active participation of women in companionship, recreation, creative and productive activities etc., may compete with her raising of children. Women who had been engaged in such activities were frequent users of contraceptives and consequently showed lower fertility.

The foundations of one's social attitudes, religious beliefs, etc. are all laid in home during early years of one's life. Thus the type of training in childhood determines how independent and responsible a woman feels as compared to the man in the family. In particular, 'independence training' viz., to learn to be self-reliant in a situation of relative freedom from parental control is likely to play an important part in developing one's sex-role perception. We may expect a woman who experienced very traditional and conservative form of childhood training to display tradition pattern of sex-role, i.e., a passive role in subsequent adult life, giving rise, consequently to a negative attitude towards family planning, while the opposite will be true for someone who received 'independence training'.

The Socio-cultural Factors

Chaudhury's [3] research on urban married women found a strong positive relationship between female education and the use of contraceptives. More educated females revealed lower fertility as measured by number of children born. He found that these relationship was true for every age group. Studies conducted in Thailand [7] and Singapore [9] also revealed very convincingly that better educated wives desired fewer children and showed more favourable attitude towards the government programme of family planning than the poorly educated wives.

Several studies have found that income level of an individual is also an important determinant of fertility regulating behaviour. Chaudhury [2]

in his study found that level of income has a positive relationship with attitude towards abortion as a method of population control. Similar results were obtained in two studies in India [6 ; 18].

Researchers have also attempted to examine the impact of residential background on one's attitude or behaviour in the context of family planning. Chaudhury [2] found that those who lived 10 or more years of their life in village had relatively less support for abortion.

On the basis of the above discussion, the present study hypothesizes that the women who differ in their (1) decision making behaviour, (active-passive), (2) sex-role perception (liberal-traditional), (3) independence training experience (more independent-less independent) (4) educational background, (5) economic status, (rich-poor), and (6) residential background, (rural-urban), also differ in their attitude towards family planning. The following sections make an attempt to test these hypotheses.

III. DATA AND METHODOLOGY

In all 240 females of procreative age from 9 districts of Bangladesh were selected as subjects for this study. A large portion of the sample comprises of unmarried women, because they are the potential individuals whose attitude development towards family planning is of great significance in the population growth of our country. The age of the subjects ranged from 16 to 45. Half of the subjects were selected from urban areas, and the other half from different rural areas of Bangladesh. In both rural and urban sub-samples better educated and poorly educated women were equally represented. Women who had formal education upto class X or above were considered as better educated while those who had education less than class V were considered as poorly educated.

Out of total 240 subjects, 120 were selected from rich families and 120 from poor families. Women who came from families having income above Tk. 2,000/- were considered as rich while those who came from families having income less than Tk. 600/- were considered as poor. Out of 60 rural more-educated subjects 30 were selected from wealthier families while the remaining 30 were selected from poor families. Similarly, out of 60 rural less-educated subjects rich and poor families were represented equally. The same categorization was done for the 120 urban subjects in selecting the poor and rich.

Of all the subjects, 160 were married out of which 80 were recorded as housewives and 40 as working women. In respect of age, 159 subjects ranged from 15 to 24 years, 71 ranged from 25 to 34 years, while only 10 subjects ranged from 35 to 45 years.

Name of the groups along with the number of subject selected from each group is presented below :

Groups	No	Groups	No.
1. Rural Rich Educated (RRE)	30	5. Urban Rich Educated (URE)	30
2. Rural Poor Educated (RPE)	30	6. Urban Poor Educated (UPE)	30
3. Rural Rich Uneducated (RRU)	30	7. Urban Rich Uneducated (URU)	30
4. Rural Poor Uneducated (RPU)	30	8. Urban Poor Uneducated (UPU)	30

Four separate semi-standardized questionnaires on sex-role perception, decision making behaviour, independence training and attitude towards family planning and a personal data bank, were used for the present study. These questionnaires were adapted and translated for the present study from a number of well-known original documents. The questionnaires were adapted to our culture, translated, and wherever necessary items were added. Then after giving each questionnaire an independent status, they were merged in a single form with four parts.

In its final form, the questionnaire on decision making behaviour consisted of 15 items. The items involved phenomena like decision making regarding children, earning for the family, purchasing necessities, choosing partner in marriage, choosing career, tackling family affairs during the absence of a male member, etc. Each item involved two or three alternative answers. The subjects had the opportunity to score from '0' to '17', where '0' expressed the strongest point of passive participation while '17' the strongest point of active participation in life.

First part of the questionnaire on sex role perception consisted of 34 statements, dealing with adult female role situations, particularly related to family and social life. The subjects had the opportunity to score from '0' to '34', where '0' was the strongest position of being traditional

and '34' was the strongest position for being liberal. The second part consisted of only two paragraph statements, where the subjects indicated their agreement with one of the two paragraphs. Paragraph 'A' stated that women should focus her attention on home and family affairs, while paragraph 'B' stated that women should be equal to men in opportunities, pay and types of occupation chosen. The possible score was from '1' to '5'; score '1' indicating a traditional viewpoint and score '5' a liberal one.

The questionnaire on independence training consisted of 14 items dealing with scope and freedom of thought and action, regulation imposed on behaviour, appreciation or criticism for assertive behaviour, scope and extent of mixing with members of the family, nature of purdah system, restriction on female education, etc. Each of the items involved two or three alternative answers. The possible range of scores was from '0' to '21'.

The questionnaire on Attitude towards Family Planning (AFP) contained 16 items dealing with factors like religious prejudices against adoption of family planning, impact of family planning devices on health and conjugal happiness, social indecency of family planning, justification of less child bearing for the sake of mothers' health, for reducing family expenditure, for solving socio-economic problems, etc. Each item involved 2 to 3 alternative answers. The possible range of scores was from '0' to '27'.

IV. RESULTS

All statistical analysis were performed through analysis of variance. In demonstrating the effect of Sex-Role Perception (SRP), Decision Making Behaviour (DMB) and Independence Training (IT) on Attitude towards Family Planning (AFP), the subjects were demarcated by the median score obtained in each of the variables i.e., a median split of scores was done to divide the subjects into two opposing poles. In analysing AFP, SRT, DMB and IT as a function of education, income and rural-urban background, effect of any two of these variables were controlled by manipulating the combinations of the sub-groups, to see the effect of the third variable.

Table I shows that better educated females significantly differed from poorly educated females ($P < .001$) in AFP. The \bar{X} (average) AFP of the better educated females was 21.46 whereas the \bar{X} AFP of the poorly educated females was 16.74. This difference between the concerned groups in AFP produced a large F value of 77.44 which is significant at .001 level.

TABLE I

ANALYSIS OF VARIANCE SHOWING HOW ATTITUDE TOWARDS FAMILY PLANNING DIFFERS AS A FUNCTION OF VARIATION IN EDUCATION, INCOME AND RURAL-URBAN BACKGROUND

SV	df	SS	MS	F
Total	239	5,813.96	—	—
Education (E)	1	1,349.00	1,349.00	77.44**
Income (I)	1	73.70	73.70	4.23*
Rural-Urban Residation (RU)	1	306.00	306.00	17.57
E x I	1	1.51	1.51	0.09
E x RU	1	28.71	28.71	1.65
I x RU	1	1.51	1.51	0.09
E x I x RU	1	11.70	11.70	0.67
S/EFC	232	4,041.83	17.42	—

*P \angle .05

**P \angle .001.

Thus it demonstrates very clearly that females with higher educational back-ground were possessing more favourable attitude towards family planning.

Results also show that women from rich families have more favourable attitude towards family planning. The \bar{x} AFP of the wealthier class was 19.67 whereas the \bar{x} AFP of the poor class 18.56. The difference however was significant at .05 level only.

The results also show that urban women had more favourable AFP than rural women. The \bar{x} AFP of the urban women was 20.24 while the \bar{x} AFP of the rural women was 17.98 with a \bar{x} difference of 2.26 in favour of the urban women (P \angle .001).

No significant interaction was observed between education and income, between educated and rural-urban background and between education, income and rural-urban background.

In analysing the effect of SRP, DMB and IT on AFP, only the effect of education was equalized for both the groups. This was done because education was found to be having a considerable effect on AFP.

There seems to be significant difference between women who were active participants in life and women who were passive (Table II). The active women expressed more favourable attitude towards family planning. The \bar{x}

TABLE II

SHOWING THE INFLUENCE OF ACTIVE PARTICIPATION IN LIFE ON ATTITUDE TOWARDS FAMILY PLANNING

SV	df	SS	MS	F
Total	239	5,813.96		
Education (E)	1	1,349.00		
Decision Making (DM)	1	387.60	387.60	22.81**
F x DM	1	67.21	67.21	3.96*
Error	236	4,010.15	16.99	

* P \angle .05

** P \angle .001.

AFP of the high DMB group, was 20.38 while \bar{x} FP of the low DMB group was 17.84, the difference being significant at .001 level.

The women with liberal sex-role perception showed significantly more favourable attitude towards family planning (Table III). The \bar{x} AFP of the liberal SRP group was 20.12, while that of the traditional SRP was 18.11, and the differences was significant at .001 level.

TABLE III

ANALYSIS OF VARIANCE SHOWING THE EFFECT OF SEX-ROLE-PERCEPTION ON ATTITUDE TOWARDS FAMILY PLANNING

SV	df	SS	MS	F
Total	239	5,813.96		
Education	1	1,349.00		
Sex-Role-Perception (SRP)	1	242.00	242.00	13.62*
E x SRP	1	28.71	28.71	1.62
Error	236	4,194.25	17.77	

* P \angle .001.

TABLE IV

ANALYSIS OF VARIANCE SHOWING HOW ATTITUDE TOWARDS FAMILY PLANNING DIFFERS AS A FUNCTION OF VARIATION IN INDEPENDENCE TRAINING

SV	df	SS	MS	F
Total	239	5,813.96		
Education (E)	1	1,349.00		
Independence Training (IT)	1	308.38	308.38	17.70*
E x IT	1	45.10	45.10	2.59
Error	236	4,111.48	17.42	

*P<.001.

The results also show that the women who had more independence training were possessing more favourable attitude towards family planning. (Table IV). The \bar{X} AFP of the women who experienced more independence training (IT) during childhood was 20.28, while that of the women who experienced less independence training was 18.02, and the difference was significant at .001

V. DISCUSSION AND CONCLUSION

The results of the study are supportive of the hypotheses that the women who were active participants in life, who had liberal sex-role perception and who experienced higher independence training would express more favourable attitude towards family planning (AFP), as compared to their opposites. The results also support the hypotheses regarding the socio-cultural variables that the women who would have higher educational background, who belong to a rich family and who reside in urban area, would have more favourable AFP, as compared to their opposites. However, among all the psychological and socio-cultural variables investigated, educational level was found to be the most significant determining factor of AFP, while economic level was found to be of least significance. Among the psychological variables, decision-making behaviour, that is, active-passive participation in life was found to be the most significant determinant of attitude towards family planning.

The positive effect of education on AFP obtained in this study is supported by many earlier research. A study in East Java, Indonesia [5] showed that about 77.8% of the educated females revealed their willingness to use family planning methods as compared to 61.1% of the uneducated families. The positive effect of education on AFP has also been reported by Sirageldin *et al.* [14] and Chaudhury [2] in Bangladesh.

Based on the findings of the present study and previous research done in this area, it can be suggested that to develop favourable attitude towards family planning it is essential that first and foremost a vigorous education programme be launched. Comprehensive women programmes should also be initiated to become active in life, so that they can come out of their seclusion and develop liberal sex role perception breaking away from traditions, prejudices and superstitions. At present only 2.9% of our women folk have educational background between 6th to 10th grade (1974 census). No amount of money can bring success to any family planning programmes unless our people become educated.

Hence it would be more beneficial if the money that is being spent today on population control sector was spent for a nationwide primary education programme. At present more money is being spent on higher education than either on secondary or primary education. In 1975/76 fiscal year our policy makers allocated Tk. 75.6 million for primary education, Tk. 36.3 million for secondary education, whereas Tk. 118.00 million was allocated for our 6 universities. But the benefits of this kind of education goes to the privileged few. Therefore, for the greater benefit of the society we should immediately start a programme to provide minimum education for all. Otherwise our service-oriented family planning programmes can never reach their desired goal.

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Book Review

Irrigation Technologies in Bangladesh : A Study in Some Selected Areas ;
by M.A. Hamid, S.K. Saha, A.J. Khan and A. Rahman, Department of
Economics, Rajshahi University, 1978.

The present title is one of the few books written exclusively on irrigation in Bangladesh. It deals with irrigation technologies in South-Western and North-Western districts of Bangladesh. More specifically, it covers selected areas of deep tube-well (DTW) irrigation in Natore and Thakurgaon, low-lift pump (LLP) irrigation in Natore, canal irrigation in Kushtia and dugwell (DW) irrigation in Naogaon.

The authors want to see *inter alia*, whether present institutional arrangements for distribution of irrigation water create obstacles for the structurally disadvantaged small and tenant farmers. At the very outset (p. 6), the authors express the apprehension that inadequate institutional arrangements for dissemination of modern agricultural technologies may create two situations viz. , (i) relatively easy access to modern agricultural inputs for the rich peasants (or farmers) in contrast to the poor peasants would aggravate inequality of income-distribution in agriculture and/or (ii) higher rates of return in other avenues of investment e.g. , moneylending, petty trading, sub-contracting in urban construction etc. , for the well-to-do farmers, on the one hand and prohibitively high cost of production in irrigated agriculture for the small farmers on the other, may create paradox of underutilized capacity of modern irrigation technology.

The book is divided into three parts. Nine chapters make parts I and II. Part III consists of a large number of statistical tables. These tables are on yield rates, cropping pattern, cropping intensity, etc. and presented without any further analysis. Part I consists of chapters 1 to 5. These chapters cover general introduction to the study, a description of irrigation technologies and irrigation-related institutional arrangements in Bangladesh, sources of data, overall findings and policy conclusions. Part II is covered by chapters 6 through 9 and it pours wealth of data on the selected areas.

A large amount of primary data has been collected for this study. But the authors did not employ a uniform methodology for this purpose.

For the Natore villages, a questionnaire-interview method was employed. The investigators stayed in the villages for the whole year in 1975 and collected comprehensive household data on assets, demographic aspects, education, skill, input-use and output in agriculture. In two of the villages the survey covered 100 per cent households taking irrigation while in other three villages the coverage ranges from 25 per cent to 50 per cent of the total households.

For the other two areas viz., Thakurgaon DTW project and Ganges-Kobadak (G-K) canal irrigation project, the authors mainly utilized secondary data supplied by Bangladesh Water Development Board. In addition, they interviewed a group of farmers taking irrigation and the executives and other related people implementing the projects.

The authors have found that with the introduction of modern irrigation methods farmers are producing more productive crops like IR-8, Chandina, IR-276 and Saita in the Natore villages. In G-K project areas of Kushtia, the shift has been from mixed *Aus/Aman* acreage to local *Aman* (both transplanted and broadcast), high-yielding variety (HYV) *Aus* and HYV *Aman*.

One of the limitations of the study is that it is not possible to compare costs of production in irrigated agriculture of different areas under study. Such data were not collected except for the Natore villages. But even for the Natore villages, data on costs of production are presented in a clumsy way. It would have been useful to learn about variation in input-use, costs of production and productivity by farm size and by income group. But the authors have provided information on costs of production of all crops taken together, which is of no help at all for inter-farm comparison of cost of production. Cropping intensity and crop-mix of different farmers vary. Simply by looking at the average cost of production of all crops one cannot say whether the inter-farm variation in costs of production is due to difference in cropping intensity or crop-mix. The authors should have adopted the usual practice of making an inter-farm comparison of some major crops of the area, e. g., IR-8, Chandina, Saita etc. Moreover, nobody can get a clear idea from the tables on costs of production whether they include all inputs, both purchased and family-based.

One of the most interesting chapters of the book is the one on policy implications of irrigated agriculture. The authors rightly think that while proposing a set of policy package for transformation of productive

forces in agriculture one should not be forgetful of the objective realities in Bangladesh. Some major ingredients of the reality are, the class-formation in agriculture sector, the class-character of the people formulating the national plans and implementing it and finally and most importantly, the relationship between the indigenous dominant classes and the foreign donors (who finance the lion's share of these development programmes). In the backdrop of these objective realities, the authors discuss the issues of choice of technology, choice of irrigation-related inputs, pricing of inputs, choice of crops and structural and institutional obstacles. They have found that DTW, LLP and canal irrigation technologies do not compete everywhere. But where they do compete, DTW is preferred to the others due to its relatively less wastage of water. A particularly interesting discussion in this context centres around the prospects and problems of the indigenous irrigation technology called dugwell (DW) irrigation. It is cheap and in a capital-poor and labour-surplus country like Bangladesh, DW can be effectively utilized in small farms. The large farms might also increasingly utilize DW with the help of hired wage labour and achieve sizeable surplus. If the process continues, at some point, backed up by the surplus the rich farmers might go for labour-displacing irrigation technologies like shallow tube-well (STW) and deep tube-well (DTW).

After dwelling at length on institution-building in rural Bangladesh, the authors come to the conclusion that all these efforts at transforming traditional agriculture and improving income-distribution of rural people is stuck up in the morass of unprogressive production relations. Only a socio-political struggle can establish the pre-condition for the transformation of productive forces.

The volume is an important addition to research publications on Bangladesh. Anyone interested in irrigation in particular, and in the problems of transforming traditional agriculture in general, will find this book valuable.

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Formulating A Viable Land Policy for Bangladesh—What Do We Need to Know

by

ABU ABDULLAH*

This paper attempts three things. First, it tries to put the discussion of land reform policies in its proper context by relating it to the existing agrarian structure. Secondly, it presents a critique of too-facile generalisations about the supposed benefits of certain recommended policies. Thirdly, it broaches a discussion of the political preconditions and consequences of these policies. The first three sections develop the argument that the dominant mode of production in Bangladesh agriculture is a petty peasant mode of production, whose workings are modified in important ways but not yet qualitatively transformed by the dominance at a higher level of the world capitalist system. It is the fragmented nature of peasant property, rather than rent, usury capital, or merchant capital, that constitutes the main internal barrier to growth. It is argued that while policies like abolition of sharecropping and ceiling legislation may be politically essential as a transitional programme, they cannot provide in themselves a solution to the agrarian problem. Finally the paper tries to evaluate the political feasibility of the various policies discussed, given the existing class structure and the class nature of the state, and concludes on what may be called a guardedly pessimistic note.

I. INTRODUCTION

It has by now become part of the conventional wisdom that in many if not all underdeveloped countries, the agrarian structure represents an

*The author is a Senior Research Economist in the Bangladesh Institute of Development Studies. This paper is a revised and expanded version of a paper presented at the ENDA Conference on "Basic Needs, Appropriate Technology and Agrarian Reform", Dacca, Bangladesh 7-16 March, 1979.

obstacle to development. Even institutions traditionally regarded as conservative are now preaching land reform. Thus a recent USAID publication states quite categorically : "...the current situation in Bangladesh is one in which the traditional agrarian structure (defined by institutions of custom and law) can be said to be both an impediment to the dissemination of new technology in agriculture, and, at the same time, an obstacle to the full participation of the rural majority in programs of rural development" [9, p. 69]. If these authors, like many others, finally prudently refrain from recommending any thoroughgoing land reform measures, this is, at least ostensibly, on grounds of feasibility. This emerging consensus on the inhibiting role of the agrarian structure on development has been accompanied by an increase in the volume of research being done on agriculture, rural society, rural institutions and so on. Unfortunately, much of this research lacks purpose or direction. Data are collected in a routine fashion on certain standard items, displayed in tabular form or run through a computer to yield various coefficients, and the whole thing is rounded off with pious recommendations which in fact have little to do with the research findings. There are in particular, a number of red herrings—the most notable one being perhaps the farm-size-productivity debate—whose pursuit is taking up an inordinate amount of research resources.

The purpose of the present paper is mainly methodological. It does not try to answer any questions—except perhaps in Section III, where I do try to offer and defend a particular characterization of the agrarian structure in Bangladesh. Mainly I have been concerned to indicate what the appropriate questions are, and what systems of concepts, what forms of discourse, are needed to ask these questions and to try to answer them. In particular, I have tried to demonstrate the inadequacy of certain simplistic arguments current in the literature as well as in "commonsense" thinking, which purport to demonstrate the desirability of certain reform measures. While the discussion centres on Bangladesh, some of the issues raised are quite general and should have a wider relevance.

II. IDENTIFYING THE BARRIERS

I shall start by putting forward some propositions, definitional and substantive, which I shall not attempt to elaborate here. The arguments are developed at length elsewhere [2].

By the agrarian structure I shall understand the combination of modes of production in agriculture (and by agriculture I mean here chiefly the cultivation of seasonal field crops). By a mode of production I mean a certain form of labour process, structured by certain relations of effective possession/separation of the (chief) means of production, and corresponding forms of surplus-appropriation.¹ To say that a certain agrarian structure presents an obstacle to growth is to say that the dominant mode of production in agriculture is one that is characterized by stagnation or quasi-stagnation of the forces of production in agriculture, and also that as a consequence enough surplus is not being generated in agriculture and/or not being productively utilized either in agriculture or outside it. Note therefore that the role agriculture plays in development depends critically on the forms of its articulation with the rest of the economy—it is never enough to consider agriculture in isolation. The agriculture/non-agriculture division is one that cross-cuts the analysis of the economic formation into its constituent modes of production, and it is this second analysis that is decisive for getting some idea about the causes of stagnation. Nevertheless, starting with the “agrarian question” is convenient if only because it locates the discussion in familiar empirical terrain and prevents it from going off altogether into the rarefied realms of high theory, and initiates more directly a concrete analysis of the concrete situation.²

The first thing to do, therefore, is to identify the modes of production in agriculture, and to specify the forms of their articulation among themselves and with the non-agricultural sector. For this we need to collect information on the following aspects of the process of social production :

1. What are the main instruments and objects of labour ?
2. Do certain non-labouring agents exercise effective possession (not necessarily identical with legal “ownership”) over these means of labour ?

¹I am following Hindess and Hirst in their “pre-autocritique” phase [8, pp. 9-11].

²Altogether too much ink has been spilt, and too many hairs split, in discussion about the relation between the order of thought and the order of discourse. In my opinion there is no necessary relation.

3. On what terms are the labourers and the means of labour brought together ?
4. What is the process of circulation/redistribution of the product ?
5. Through what means and to what extent is the reproduction, (a) of individual labour processes, and (b) of the total social labour process, assured ? The distinction between (a) and (b) is important because the reproduction of the total social labour process may involve the more or less systematic non-reproduction and extinction of certain individual labour processes.
6. What categories of agents appropriate the surplus, in what forms is this surplus appropriated, and how is it disposed of ?

On the basis of these criteria, I believe that broadly three modes of production can be identified in Bangladesh agriculture.

1. A feudal mode under which the legal owners of land also retain effective possession of land in the sense of having virtually unfettered rights of eviction of the direct producers. Surplus is appropriated chiefly in the form of rent in kind, thus without the intermediation of the market. Here it is the landowners' decisions regarding the size of the plots rented out, the frequency of eviction and the volume of rent which are decisive for the conditions of reproduction of the peasant household "enterprises". The tenants are usually also subject to exploitation through forms of usury and merchant capital.

2. A peasant mode of production where the direct producers are, if not always the legal owners, at least the effective possessors of most of the land they cultivate. (As a matter of fact, since the abolition of the Permanent Settlement, legal ownership and effective possession coincide to a large extent.) These need not be "owner-farmers" in the sense that they own all the land they till, but they do own enough to ensure at least simple reproduction, even if at a low level of production and consumption, of their household economy. Here again, and perhaps more than for the feudal mode, usury and merchant capital are likely to play a significant role. Note that the use of wage labour is quite consistent with the peasant mode.

3. A capitalist mode of production, which is articulated closely to the national and international market. Production is by wage labour, the product is primarily intended to be a commodity, and surplus is appropriated in the form of surplus value.

These three modes do not, obviously, co-exist in isolation from each other and from the world economic system. The peasant mode in particular is not a new name for "natural economy". It is a peasant mode that is penetrated and impoverished, at the same time as it is sustained, by forms of merchant and usury capital as well as some forms of rent. But these have not yet fundamentally affected the conditions of reproduction, nor are these the decisive relations of production that structure the forces of production.

Empirical investigation must establish the relative quantitative importance of these various modes of production and also the forms of their articulation in the economic system. My own guess would be that the peasant mode (as I have defined it) predominates quantitatively, but all three modes are subject to the dominance of metropolitan capitalism in the last instance. However, without a concrete determination of the precise modality and extent of this dominance, the last statement would remain an abstract compromise formula.

Where exactly in this complex structure are the barriers to growth to be located? In a very real sense the barriers are not internal but external. It is the place occupied by Bangladesh in the world capitalist system³ that determines the limits to the growth of indigenous capitalism, which in turn perpetuates backward, stagnant modes of production in agriculture. We cannot, however, change the world system and even if we could and did break out of it, this would not bring in its wake automatic solutions to the agrarian problem. Besides, the relationship between imperialism and backwardness is not a unilateral one—if imperialism perpetuates backwardness, backwardness also invites imperialism. And while the final assault on the problem must be political, there are things that have to be done both before and after. Finally, reformist

³As Laclau has pointed out, it is important to distinguish between modes of production and economic systems. It is illegitimate to speak of the world capitalist, or the "colonial", mode of production [10].

changes, as long as they are unpretentious, need not necessarily be counter-revolutionary.

Very schematically, then, the following reasons may be suggested for the continued reproduction of backwardness in the agrarian sector.

1. The capitalist mode cannot expand because of (a) the weakness of urban/industrial capitalism, (b) the "disarticulated" nature of domestic capitalism, whereby linkages between industry and agriculture are disrupted and (c) the preponderance of parcellated, fragmented peasant property forms on the land which makes penetration by productive capital difficult.
2. The feudal mode offers virtually unlimited scope for the extraction of absolute surplus value. There are no structural compulsions whatsoever for the generation of relative surplus value. The laws of motion of the peasant mode are constantly replenishing the reservoir of dispossessed peasantry who can be exploited intensively on the basis of the existing mode of production.
3. The peasant mode, while not perhaps as ineluctably counter-productive as Marx indicated (witness Japan), is certainly in general and in the specific context of Bangladesh caught in a cycle of simple or restricted reproduction. Even in the absence of the depredations of usury and merchant capital (which however are its inevitable concomitants), the laws of population to which it is subject would ensure its perpetual impoverishment.

The peasant mode cannot be saved, it can only be transcended—either through its own momentum or through purposive action. In what direction it would evolve if left to itself depends on developments in the national economy as a whole. Again, my own guess would be that the relative weights of the three modes are not going to change significantly, though perhaps the feudal and to a lesser extent the capitalist sectors will expand somewhat relative to the peasant sector.

It is against this background that land policies—policies designed to change the agrarian structure—have to be formulated and evaluated.

III. A PEASANT MODE OF PRODUCTION ?

The above formulation, particularly the attribution of dominance to a "peasant mode of production", may seem provocative, not to say suspect, to many Marxists. Some elaboration is therefore in order, though it might in fact aggravate the provocation.

As mentioned earlier, I am adopting the concept of mode of production as elaborated by Hindess and Hirst, and therefore, in particular, I agree with them that not every relation of surplus-appropriation is a relation of production—e. g., we can have "feudal rent" without the feudal mode of production [8, p. 225]. A form of surplus-appropriation, whether feudal rent, usurious interest payments, or "unequal exchange", would constitute a relation of production only if it could be shown to be the decisive factor in determining the structure of the labour process and the tempo of development/underdevelopment of the forces of production.

I define the peasant mode of production much as Marx's "petty mode" or Sahlins' "domestic mode of production" [14, pp. 581-87, 784-87; 18, pp. 74-99]. The primary form of surplus-appropriation is direct appropriation by the direct producers, associated into "collective workers" through the mediation of kinship, in the form of domestic groups (augmented at need through the creation of putative kin relations). Access to the main means of production, and hence reproduction of the unit of material appropriation, is basically controlled by kinship relations. The "laws of motion" of the mode depend mainly on natural/demographic factors.

It is essential to grasp that pointing to the presence of rent (even excessive rent), usury and merchant capital, and wage labour do not invalidate the applicability of this concept to a particular concrete situation. What would have to be demonstrated is that one or more of those forms of exploitation play the decisive role in the reproduction of the social process of production. I would indeed suggest that some forms of rent, in particular the sharecropping relation, and also usury capital, are (at least in the context of Bangladesh) necessary effects of the peasant mode of production—contradictory effects, to be sure, which may under certain conditions lead to the supersession of the peasant

mode. But it should surprise no Marxist that a mode of production may produce as effects the conditions of its own supercession.⁴

I do not have at hand material for a rigorous demonstration of the dominance of the peasant mode. Some impressionistic empiricism may, however, make the claim at least plausible. Mainly I shall try to show that the alternative hypothesis of feudalism is not tenable. I shall not take up here the rival claims of capitalism, not because I do not think these claims are worth taking seriously, but because their evaluation would require much more elaborate work at both the theoretical and empirical level.

First let us note that tenant farming, surely a necessary (but not sufficient) sign of "feudalism", is quantitatively relatively unimportant in Bangladesh. Table I summarises some evidence :

TABLE 1
PERCENTAGE OF HOLDINGS, WITH PERCENTAGE OF AREA
OPERATED, IN DIFFERENT TENURE CATEGORY

Tenure Category	Groups					
	1960		1976		1977	
	Per Cent of Holdings	Per Cent of Area	Per Cent of Holdings	Per Cent of Area	Per Cent of Holdings	Per Cent of Area
Owner	60.77	53.64	58.45	54.67	61.17	63.95
Owner-cum-tenant	37.60	45.24	41.16	45.10	31.99	41.65
Tenant	1.63	1.11	0.39	0.23	6.84	4.39

Source : 1960, Census of Agriculture, 1976 Pilot Survey of Sixteen Thanas, Bureau of Statistics, and Jannuzi and Peach [9]. Taken from [3].

⁴In a passage tacitly accepting the petty mode of production, Cutler *et al.* argue that this mode cannot in fact supercede itself but has to be vanquished "from outside" : "what is it in the petty mode that causes it to break down and to be superceded by capitalism ? Differentiation of the petty producers ? Formation of commercial and financial capital and their penetration into the commodity-producing sector ? Neither of these processes can resolve the mass of the independent producers into wage-labourers, they kill the few but the many survive and cling tenaciously to their means of production" [5, p. 146]. The source of their apocalyptic certainty is not clear,

When all the customary and perfectly valid reservations are made about the reliability and comparability of the data, one is still struck by the relative stability of the proportions, particularly of the proportion of owner-cultivators as well as the proportion of area tilled by them (for 1977 the figures for owner-cultivators have been obtained by adding together those for "owner" and "owner-manager"). It would seem a reasonable presumption that around sixty per cent of farm families do not take in any land, and they operate around half the land. (The smaller owner-farmers undoubtedly also work as wage-labourer or at other occupations, and are undoubtedly wretchedly poor—I am by no means trying to paint a rosy picture of a prosperous and contented peasantry.) It should also be remembered that of the area operated by owner-cum-tenants, more than half is owned by them—owned area as a percentage of operated area appears to have declined over the period, being 62.32 in 1960, 58.43 in 1976, and 55.64 in 1977 (sources for these figures are the same as for Table I).

Given the insignificant amount of pure tenancy, feudalism or "semi-feudalism" must be looked for in the owner-cum-tenant stratum. Let us take a closer look at the structure of this category.

TABLE II
CHARACTERISTICS OF OWNER-CUM-TENANT FARMS, 1960 AND 1976

Size of Holdings	Percentage of Holdings		Average Size of Holdings		Owned Land as Percentage of Area Operated	
	1960	1976	1960	1976	1960	1976
Small	35.63	41.42	1.49	1.47	55.07	54.27
Medium	51.73	48.86	4.31	4.15	59.90	57.91
Large	12.64	9.72	11.84	12.27	68.50	61.43

(Small = Less than 2.5 acres, Medium = 2.5 to less than 7.5 acres, Large = 7.5 acres and over).

There can be no doubt that the small peasants, and a significant proportion, say half, of the medium peasants, are critically dependent on the rented-in land for the reproduction of their household economy. We may deduce that of the forty-odd per cent of peasant households

who rent in some land, as much as 60-70 per cent are dependent on the larger landowners for their livelihood. This is in addition to the dependence of these people as well as the small owner-farmers, on agricultural labour and credit for which also the chief sources are likely to be the substantial peasants. This dependence appears also to be going up with time—small owner-tenants are getting more numerous, and medium owner-tenants are operating less land, and perhaps also owning a smaller percentage of it.

Obviously rent plays a more important role in the rural economy than would be revealed by a mere comparison of areas under different tenancy arrangements. Sharecropping cannot be dismissed as an unimportant phenomenon just because only twenty-odd per cent of the cultivated land is sharecropped. However, this in itself does not prove that this share rent corresponds to any coherent concept of a "feudal mode of production".

I suggest that two questions have to be answered here. First, does the tenancy relation have significant effects on the level and tempo of development of the productive forces? And second, is the tenancy relation a self-reproducing one, or is it essentially reproduced as an effect of some other mode of production?⁵ Now we know that according to some evidence sharecropped farms tend to be less efficient. Even if this evidence were unassailable and uniform (and it is not—see, e.g., [7; 17]), one could still be sceptical that the differences amount to a difference in the level and dynamic of the productive forces. I would suggest, indeed, that the forces of production on tenant and owner farms are the same, and both bear the impress of what I have defined as the peasant or petty mode of production, whose relations thus dominate and assimilate the rent relation.

On the second point, I think that share tenancy may to some extent be able to secure the bases of its own reproduction. This it does

⁵There is actually a theoretical and practical problem of some importance here. To insist that modes of production must be distinguished by their productive forces can cause one to lapse into a position where the productive forces are all that matter, and social relations are redundant. China and India might appear to have the same mode of production according to this criterion, applied carelessly and in an extreme form,

by keeping the tenant too poor to accumulate enough land to become independent of the "landlord". However, I would suggest that this is not the principal mechanism through which sharecropping is being reproduced in Bangladesh. Briefly and bluntly, peasants are not poor because they are tenants, they are tenants because they are poor. This poverty itself is generated mainly by the "laws of motion" of the peasant mode of production. Indeed, sharecropping may be seen as a mechanism which aids the conservation and reproduction of the peasant mode, by adjusting—admittedly on inequitable terms—disparate land/domestic labour ratios.

Another bit of factual information that in my opinion supports the idea of a peasant mode is about the way in which people came to own land. According to preliminary data from the IRDP Benchmark Survey, 42.48 per cent of households did not own any land at all, but of the remaining 57.52 per cent, 36.11 held their land by inheritance only, another 9.47 by inheritance plus purchase, and 7.92 by purchase only [15, p. 56, Table 9.2]. This would seem to show that land is not yet in practice a commodity, and that access to land is still largely determined by kinship relations.

What, it may be asked, about the large numbers of the landless? How do they fit into the notion of a peasant mode of production? I would make three points. First, these landless are the product, not of a process of "primitive accumulation" (and even that phase belongs to the pre-history of capitalism rather than to capitalism itself), but overwhelmingly of demographic and natural processes. Second, they are certainly not engaged in tenant farming in significant numbers, so they are not part of the feudal mode. They are mostly engaged in agricultural and non-agricultural wage-labour, but (and this is the third point) wage labour by itself does not indicate capitalism (see [19]). They may at best signal the possibility of a transition. Thus I would argue that the agrarian structure in Bangladesh can best be characterized as one of three modes of production in articulation, of which the peasant mode is dominant. (Further investigation may indeed lead one to speak of two modes in articulation—the "feudal mode" may be non-existent.) This peasant mode is indeed modified in important ways by the working out of its inner contradictions as well as by the penetration of

national and international capitalism, but by no means yet superceded. And in my opinion it would be far too glib and hasty to pretend that the peasant is inevitably doomed, and is already being replaced by new classes. We may recall that Lenin made a similar prediction about the Russian peasant in 1898 (a prediction he modified in 1908), yet the ghost of the peasant refused to be laid until Stalin took matters in his iron hand.

Having set the background, let us now discuss possible changes in this structure.

IV. DESIRABILITY AND FEASIBILITY

What kinds of changes are possible ? And of the possible changes, which is best ? These are the two key questions, formulated in the idiom of neo-classical economic theory, that we would like to be able to answer. Before we try to answer them we must have some idea of what we mean by "possible" and by "desirable". Again, in neo-classical idiom, we must identify the constraints defining the feasibility set and also specify our objective function.

What is emphasized in the literature is usually the difficulty of specifying an objective function that will be consensually accepted. However, the problems of defining the feasible set are no less intractable, and present the analyst with one of his most excruciating dilemmas. I have in mind particularly the handling of political-ideological constraints. Should one accept the existing political structure as given and limit one's policy options to those that the regime currently in power is likely to be willing and able to implement ? Or should one give a more complete list of possible policy changes and indicate, where necessary, the kinds of political-ideological changes that would be required to make this policy an acceptable one ? And should one, in the latter case, also try to estimate the probabilities of such political changes ? The first course is more likely to be immediately "useful" and "practical", but is inevitably conservative. The second course, on the other hand, could very well degenerate into visionary declamations devoid of scientific content.

Bearing these twin pitfalls in mind, I shall choose the second alternative, and discuss policy options of various degrees of "radicalness".

That is, I shall not abstain from discussing policies that are clearly "infeasible" given the existing class nature of the state in Bangladesh.

As for desirability, I shall, without further discussion, take the following to be the objectives of any land policy :

1. Growth in gross agricultural output.
2. Growth in the volume of agricultural surplus available for transfer to non-agricultural (not necessarily urban) activities.
3. An improvement in living standards of the rural poor, or at the very least an arrestation of the process of pauperization.
4. Limiting rates of rural-urban migration to levels consistent with the growth of urban employment opportunities and civic amenities.

I shall now take up some policy options that are usually discussed in this context, and try to deduce, not so much their relative desirability and feasibility, as the kinds of analysis we would require in order to arrive at such judgments.

V. SOME ALTERNATIVE POLICIES

At various times in the history of tenancy legislation and agrarian movements in this part of the world, the following measures have been discussed :

1. Policies Regarding Sharecropping

- (a) Giving sharecroppers tenancy rights, i.e., essentially giving them security of tenure and protecting them against arbitrary evictions.
- (b) Restricting the maximum permissible crop share going to the landlord, usually to one-third of the produce (when landlord does not provide inputs other than land).
- (c) Abolishing sharecropping :
 - (i) through commutation of produce rents at stipulated rates ;
 - (ii) allowing the landowner to resume land given out on sharecropping and dispose of it as he sees fit ;

- (iii) declaring all land being sharecropped at a particular point of time to be the property of the sharecropper—suitable exceptions being made, of course, for the famous widows and orphans.

2. Policies Regarding Subletting

Paradoxically, while sharecropping is not forbidden under the law, subletting on cash rent appears to be explicitly prohibited. (I say “appears to be” because there may be some scope for confusion in the definition of “subletting”.) Clearly subletting in the sense of renting out land on an annual or longer term basis is widely prevalent. It is a transaction in which no legally binding documents are drawn up, and the terms and incidences are totally determined by market forces and by custom. Making this prohibition more effective would be one conceivable (one hesitates to say possible) policy option.

3. Policies Regarding Mortgage

In theory, the only permissible form of mortgage is the complete usufructuary mortgage, where at the end of fifteen years the initial loan is considered to be completely paid off and the land reverts to the mortgagor.⁶ In practice this is usually circumvented through the mechanism of “conditional sale”. Under this the mortgagor goes through the legal motions of a sale, with a verbal understanding that he can “buy back” his land within a certain period. It is not clear what can be done about this. A shorter extinction period would clearly not really help if conditional sales could not be stopped. There are no obvious way of distinguishing conditional from genuine sales, at least within the existing legal processes.

4. Policies Regarding Selling of Land

From the day of British rule down to the present day, suggestions have been made at various times to prohibit the selling of land, at least

⁶An attempt was made by the Mujib government in 1974 to bring down the period of extinction to seven years, and also to prevent “conditional sales”. The law was declared unconstitutional by the High Court, and is still under appeal to the Supreme Court.

by small farmers. This was supposed to be one way of protecting them from the rapacity of money-lenders, and would of course be one way of solving the problem of conditional sales.

5. Policies Regarding Size of Holdings

Currently there is a legal ceiling of 33.3 acres on the amount of land owned by a household. Successive attempts have been made to define "household" in such a way as to reduce the possibilities of using ambiguities in this concept to evade the ceiling (notably in Presidential Order 98 and Presidential Order 135 of 1972).⁷ However, big landowners have other ways, notably bribery, of evading the ceiling, and all available evidence indicates that the existing ceiling, which is in any case quite high, is largely inoperative. Any future steps in the direction of imposing a ceiling must pay particular attention to implementability.

6. Policies Regarding Forms of Ownership and Organisation of Production

These refer to more drastic measures aimed at redefining the nature and incidence of property rights in land, and introducing *pari passu* alternative forms of organisation of the labour process. Specifically, the question is one of the degree of "communal" ownership, control and planning that can and should be introduced. The paradigm would be full-scale expropriation/collectivization of land, probably more or less after the Chinese model.

I have tried to provide a fairly comprehensive list of policy options. Of course, some of these are perhaps best considered in association, as policy packages—for example, ceiling legislation with abolition of sharecropping and/or limited cooperation. However, for discussing the information requirements of these various policies, I shall concentrate on just three possible policies : abolition of sharecropping, ceiling legislation/redistribution, and collectivization.

⁷Kamal Siddiqui provides the best available summary of the provisions of this and other post-liberation enactments. This account is, however, marred by a determination to see no good in anything done by the Mujib regime. See [20, pp. 109-22].

VI. THE QUESTION OF SHARECROPPING

Is the abolition of sharecropping desirable, and is it possible? To answer the first question we have to be able to say something about the possible effects that such a step might have on the objectives I listed above (see Section IV).

The studies on the effects of sharecropping that I am familiar with deal with differences in input use and productivity of land and labour between owner farms and sharecropped farms. If one finds that sharecropped farms show a lower yield per unit of land (the evidence is in fact mixed) this is supposed to establish a presumption in favour of the abolition of sharecropping.

Now in this form the argument does not hold. Firstly, because the results of a change from a sharecropping to a no sharecropping situation would depend on the precise nature of the latter, in particular on whether the sharecropper becomes the owner of the land or has to vacate it in favour of the original owner. In the latter case we must be able to specify further whether the owner will now rent out this land on cash rent or cultivate it with hired or family labour. If the landowner was a rich farmer, for example and the sharecropper a small one, and if the usually posited inverse relationship between size and productivity holds, then the positive effects, if any, of the change in tenancy might be swamped by the negative effects of the resulting redistribution of (operational) size of holding. On the other hand, the dynamic effects of this step are likely to be much more important than any static once for all changes in output. One can hypothesize several such effects :

1. Closing off the option of sharecropping might impel bigger farmers to move towards capitalist forms of farming.
2. At the same time, most of those who are now sharecroppers will then have no option but to become wage labourers (probably only the better off ones could readily become tenant farmers on cash rent). Therefore, both the supply of and demand for wage labour is likely to increase. What the net result on wage rates and hence living standards for the poor is likely to be is problematic.

3. Any effective ban on sharecropping is also likely to accelerate the disintegration of the peasant mode of production, since within this mode sharecropping does play a significant role in the reproduction of many peasant households' economy. The likely result is a further addition to the supply of "free" labour. This would further depress wage rates, and probably also increase rural-urban migration.

What of the disposition of the surplus, marketed and non-marketed ? That will depend on whether the net result of this variant of abolition leads to an increase or a decrease in the share of produce going to the direct producers (and also of course on whether the total produce increases or decreases). As we have seen, these effects depend on the complex interplay of a number of processes, and cannot be deduced from simple static comparisons between owner operated and sharecropper operated farms.

What of the other, apparently more progressive, variant of the abolition of sharecropping, with the sharecroppers becoming effective owners of the land they were cultivating ? The immediate result is a redirection of the surplus back to a section of the direct producers, who now acquire ownership (legally as well as in fact) over the critical means of production. This is certainly commendable from the point of view of equity. The impact on output is again not determinable in advance. In this case the findings of the kind of static comparisons I discussed above, may be more relevant. Even so, one must first test one simple but plausible hypothesis—the sharecropped farms show lower productivity (if they do) not because of the disincentive effects of tenancy but simply because land owners prefer to give out on sharecropping their worst quality land (this hypothesis was put forward by a nineteenth-century British civil servant working in Bengal, but never, to my knowledge, rigorously tested).

Suppose, however, that this hypothesis is rejected, so that we have good reasons to expect an increase in total output. Do we then have an unassailable case for this step ? Again, we must look at the dynamic and systemic consequences before we venture a positive answer.

The immediate result is going to be the destruction or at least severe restriction of the feudal mode of production (which mostly if not

invariably finds its expression, in Bangladesh, in sharecropping) to the benefit of the peasant mode. The implications for development are ambiguous, to say the least (I am speaking, of course, of such a policy taken by itself, in isolation), for the peasant mode in Bangladesh, as we remarked earlier, is not a dynamic sector. It is not likely that the destruction of the feudal mode will in itself lead to the development of "peasant" capitalism in Bangladesh. For, as I have argued above, it is not the "feudal" mode that is the obstruction to growth of production.

However, while the immediate impact of this step is an (once for all) expansion of the peasant mode, in the long run it will probably, as in the first variant, lead to a faster dissolution of this mode. Except in the unlikely event that capitalism develops with breath-taking tempo in town and country, this is going to make the tasks of development harder, not easier.

It would seem, then, that taken by itself the abolition of sharecropping is not as incontrovertibly "good" as is sometimes suggested. All my arguments, however, are conjectures. How could we test these conjectures ?

Take, for example, my first hypothesis concerning the effect of abolishing sharecropping without redistribution : I suggested that if big farmers cannot give their land out on sharecropping, they might go in for capitalist farming. (Here also the fragmented nature of landed property is likely to present a formidable barrier.) We could assume, plausibly, that the big landowner is an income maximizer, and would choose the more profitable of the alternatives available to him—essentially hiring and supervising wage labour vs. leasing out land on a cash rent. It would perhaps be possible to construct a general equilibrium model which determines simultaneously equilibrium values of the quantity of wage labour supplied and demanded, the wage rate, the volume of land rented in and out, and the rental rate. Econometric estimates may then perhaps be made of the relevant parameters and predictions made on the basis. The purely technical problems of specification and estimation would be formidable. But perhaps more importantly, such a procedure would start with the assumption that human motivations can explain changes in structures, and are therefore the motive force behind

such changes. An alternative and not less plausible assumption is that the motivations themselves are generated and reproduced by the structures. In this case the whole neoclassical econometric exercise loses its foundation and collapses. Yet alternative methods for reliable predictions about the "laws of motion" of these structures do not yet exist.

However, this does not mean that all my conjectures are irrefutable and hence "meaningless". (There are obviously many problems with this Popperian cannon of "meaning"—probability statements, for example, are strictly speaking, irrefutable.)

My statement about the unlikelihood of "peasant capitalism" could be refuted, or at least shown to be implausible, by showing that in fact there is already a strong trend towards peasant capitalism, and that the peasant sector as I define it is disintegrating much faster than I suggest.

Nevertheless, the basic dilemma remains. As I see it, the problem is that we are trying to predict the form and time-sequence of a transition from one (dominant) mode of production to another without possessing adequate concepts to think the transition. This is true not only of mainstream economics but of Marxist theory as well. A related complicating factor is the determining role of the place a country occupies in the world economic system. This means that any adequate predictive model would have to be a truly global model. We must be able to chart the course of world capitalism if we are going to be able to say anything meaningful about the dynamics of our agrarian structure.

Am I saying that a step like the abolition of sharecropping must necessarily be a leap in the dark, with consequences which are by their nature unpredictable ? Not entirely. As I have tried to show above, even purely theoretical arguments can at least alert us to alternative consequences. And some if not all these consequences can be assigned probabilities. In the current state of social science, this is perhaps not a negligible contribution.

VII. CEILING LEGISLATION

Do we need ceiling legislation ? If so, how low should the ceiling be ? And how can such legislation be effectively implemented ?

The usual argument for imposing a ceiling on the size of holding is based on considerations of both equity and efficiency. Equity is obvious enough. The efficiency thesis rests on the findings of various empirical studies to the effect that small farms produce more, and at the same time absorb more labour, per unit of land than large farms.

I have had occasion in the past to express my scepticism about this argument (see, e.g., [1]). What I contest is not the validity of this finding, but its relevance to the issues at stake here. These empirical studies lump together enterprises belonging to the different modes of production, and classify them according to size of area operated. Again the decisive question, that of transition, is eluded.

The following considerations are, in my opinion, critical :

1. The major consequence of a successful ceiling-cum-redistribution policy would be to destroy both feudalism and capitalism, and transform the entire agrarian economy into a peasant or simple commodity mode of production. In itself this would be a backward step. Much would depend, of course, on the size of the ceiling — in many areas of Bangladesh ten to fifteen acres of land would provide a very reasonable basis for profitable capitalist farming. But clearly the higher the ceiling the smaller the redistributive impact, so that here we do have a conflict between growth and equity. There may be a first-round increase in total output, but this will not be sustained. Commodity production will fall, marketed surplus will decline, and non-market mechanisms for the transfer of surplus will be difficult and costly to operate.
2. In the absence of measures to initiate a transition to socialist forms, a distribution will have little lasting effect even from the point of view of equity. The forces that cause polarization in a peasant mode penetrated by the market will continue to operate. Nor can this solve the problem of relative surplus population.
3. However, in so far as peasants who become rich cannot invest in acquiring more land, this might encourage a diversion of

agricultural surplus to more intensive farming or into non-agricultural activities. For this to be possible on any significant scale, the ceiling cannot be set very low—again unless redistribution is followed by extensive reorganization.

Here again, as in my discussion on sharecropping, I have put forward certain conjectures, and again I must confess that it is not easy to think of dependable ways of verifying or refuting these conjectures. Some minimum data requirements can of course be laid down. We need to know, for any suggested ceiling, how many households (in some rigorously defined sense) have excess land, how much land would be available for redistribution, and how many legitimate claimants (on some clearly defined criteria) there are. One must guard against some extremely naive extrapolations, like assuming that the behaviour of a peasant household owning and operating, say, five acres of land will be the same irrespective of the agrarian structure in which this household is inserted. (Amazingly, this is the fallacy committed by many respectable scholars when they try to deduce the desirability of land redistribution from evidence about the relative efficiency of small and large farms.) Here again it is the same "epistemological obstacle" (I obviously use this phrase in a metaphorical sense very different from Bachelard's) that confronts us—the lack of an adequate theory of transition. The technical practice called economics can be of only limited help here.

VIII. EXTRA ECONOMIC CONSIDERATIONS⁸

It may be argued that the arguments presented above are too economic, and fail to place the abolition of sharecropping or redistribution policies in their proper context—that of a phase, an intermediate step, in a revolutionary transition. These steps should be judged, in this view, not entirely or even mainly in terms of their contribution to production, marketed surplus, etc., but in terms of their efficacy, indeed their necessity, as such intermediate steps.

I would agree entirely with this criticism, and therefore, I am going to try to say a few words about the possible political and social effects of these steps, or for that matter, of agitating for these steps.

⁸This section is an attempt to take account of a point raised by Rugumisa.

I think the political argument for abolition of sharecropping and redistribution (I shall refer to these two measures together as "poor peasant" policies) can be summarized as follows : these policies would satisfy deeply held but non-articulated aspirations of large segments of the rural population, most probably of the vast majority of the poor and even of some middle peasants. No revolutionary party can afford to alienate these masses. More than that, no revolutionary party can get anywhere without the active and enthusiastic support of these people. If such a party tried to propagate more "radical" policies immediately, they would be guilty of left adventurism, of trying to skip the "bourgeois-democratic phase" of the revolution, and would be doomed to ineffectiveness. Even if they tried it after they had captured state power, they would only succeed in generating hostility to the regime among the large masses of the peasantry, and would have to resort to coercive means. On the other hand, if the party adopted and worked for poor peasant demands, this would enable them to enter into a fruitful dialectic with the poor peasant. The poor peasant could learn the value of organization, their consciousness would be raised, and after the party is in power and "their" policy is implemented, they would themselves discover in due course the advantages of moving on to higher forms of cooperation.

To put it bluntly, the party knows that small peasant property is doomed, and must be replaced by cooperative forms. But the small peasant does not know this, and what he wants from the party is protection for his small property. The party must therefore humour the small peasant, and wait for him to "catch up" with the party.

I am not setting up a caricature of the position in order to tear it apart. I am not going to accuse those who talk like this of "elitism" and "disrespect for the masses". I think we have far too much sentimental (or motivated) glorification of the "masses". The party should be an "elite", that is the whole point of having a party. And on most important issues, the party probably does know more than the masses. And on the whole I agree with the above argument, that the pace at which we proceed towards collective forms must not outstrip the consciousness of the poor peasants.

There are just two things that worry me about this position. First, what happens if the peasant, with proverbial peasant obstinacy, refuses to "catch up" with the party, refuses to move on to collective forms ? The answer I suppose is that this could only happen with those peasants who have managed to enrich themselves, and that then the party must unite with the new poor peasant—again to protect his small property ? Clearly we can remain stuck in this cycle for ever.

Hopefully this is only an academic possibility—the poor peasant will see that even if a few can move up to become rich or middle peasant, for most of them small private holdings can only mean poverty and extinction.

The second thing that worries me is that arguments about the need to rally broad masses of the people behind the party can easily degenerate into apologetics for opportunism—as when our home-grown "Marxist-Leninists" start talking about "patriotic" landlords and "patriotic" capitalists. A revolutionary party must indeed seek power, but not at the cost of class alliances that will tie its hands, and force it to serve an exploiting class while mouthing slogans about the dictatorship of the proletariat.

Still, I agree that as transitional, minimum programmes, poor peasant policies may be indispensable. But what I am concerned to show, in opposition to some ideologues of petty peasant production, is precisely that this cannot be more than a transitory phase—it cannot provide a real solution to the agrarian problem.

One factual point, however. According to the available evidence, Bangladesh has a much higher percentage of landless rural households than either China or Russia before their revolutions. According to figures cited by Donnithorne [6, p. 36], the percentage of landless households, in studies made in various places between 1925 and 1937, varied between 3 and 17 per cent.⁹ In Russia, households cultivating no land (large members of these in fact had small bits of land which they rented out)

⁹According to data from J. L. Buck, as given in [16], in Buck's sample areas, 54.2 per cent of peasants owned all the land they tilled, another 39.9 per cent were part owners, and tenanted land was 28.7 per cent of all cultivated land. Figures given in communist sources are, of course, very different. See [16, p. 35, Table 3-1].

constituted, for four gubernias for which Lenin presents data, a rather small percentage of all households—between 7.4 and 10.2 for three, and 22.7 for one [12].¹⁰ Thus one may argue that unlike Russia or China, in Bangladesh agriculture the “purely proletariat” element predominates over the petty-bourgeois element, so that a somewhat more radical strategy may be feasible or even essential. I do not press this point, because only people actively involved in political work among the peasants can give a reliable answer. However, I would insist that such people must have a mind open enough to raise the question.

A word about the “consciousness effect”. Land redistribution, it is suggested, will raise the consciousness of the poor peasant. In particular the process of implementation, which will inevitably require local participation, will give them invaluable experience in organization. It may be argued that on the contrary, if not followed soon enough by more radical measures, the regime of petty peasant proprietorship ushered in (or reinforced) by the reform may in fact perpetuate a petty-bourgeois ideology. Rosa Luxemburg’s assesment of the Bolshevik land policy—that it “has created a new and powerful layer of popular enemies of socialism on the countryside, enemies whose resistance will be much more dangerous and stubborn than that of the noble large land owners” [13, p. 46]—seems to have been on the whole justified by later events. And did not even a Bolshevik admit in 1929 that because of this land policy, “... the danger existed of a great strengthening of the ideals of petty ownership” ? (V.P. Milyutin, quoted in [4, pp. 156-157]).

To avoid accusations of sitting on the fence, let me say quite clearly that I am not suggesting that the landless can or should be immediately set against the landed. On the contrary, such a policy would be politically and economically suicidal. There is a need for a transitional phase of redistribution, but it must be a short transition.

These considerations, however, remain utopian in the absence of a strong revolutionary party. What policies are feasible depends on the

¹⁰Lenin himself underplays the distinction between absolutely landless and small below-subsistence peasants. It is interesting that while in 1898 he assimilated them both under the term “proletariat”, in 1908 he preferred to speak of the “ruined peasantry crushed by feudal exploitation” [11, p. 227].

class basis of the state. To some of these considerations I shall return in the final section. For the moment let us return to the safer world of purely economic considerations.

IX. COOPERATION AND/OR COLLECTIVIZATION

A radical redistribution of land on the basis of private peasant property cannot by itself solve the problems of development, and in some cases it can aggravate them. Agrarian policy in the Soviet Union, in Cuba, and to a lesser extent China illustrates this. Japan and perhaps Taiwan would appear to be counter-examples, and it would be extremely interesting and important to try and understand this difference. I cannot do this here. I can only reiterate my conviction (which certainly needs to be subjected to rigorous testing) that the "Japanese miracle" is not available to Bangladesh, partly because of the very different internal evolutions of the two countries (which itself is of course not unrelated to the very different colonial experiences of the two countries), and partly because of the very different places occupied by Japan during her "take-off" and Bangladesh today in the world capitalist economy.

A possible alternative that stops short of collectivization would be a drastic redistribution followed by incorporation of the peasant into basically IRDP-type cooperatives.¹¹ It has been suggested that this would do away with the inequalitarian implication of the IRDP, prevent its pre-emption by the rich farmers, and still allow the IRDP to play its role in raising production. This option might be considered preferable because it would enable one to form an alliance with the broad peasant masses, instead of having to stake everything on the landless and the poor peasants.

I would regard this option as a supplementary one rather than a self-contained and viable policy in its own right. It could play a valuable role in organizing the transition period, in moderating and perhaps preventing any drop in marketed surplus, and in keeping alive, perhaps, the ideals of cooperation. Let me indicate briefly why I think it cannot provide a "final solution".

¹¹I am grateful to Dr. Mahabub Hossain for pointing out this alternative which I forgot to consider in the earlier versions of this paper.

Firstly, the IRDP-type structure cannot, without going beyond itself, neutralise the processes that work towards differentiation in a peasant economy. It is on the contrary likely to strengthen them. Thus one would need periodic redistribution. It cannot prevent subdivision of landed property, nor can it provide for the absorption of the new landless or for their productive redeployment.

Secondly, it cannot solve the problem of fragmentation.

Thirdly, the IRDP, with its stress on modern inputs supplied by government agencies, is structurally incapable of performing the tasks of a development strategy based on the fullest utilization of local resources.

Fourthly, the kind of class alliance involved in a policy of land redistribution drastic enough to accommodate the landless will probably not be all that different from that needed for a move towards more truly collective forms.

Thus it is to some form of communization that we must look for a solution to our agrarian problem. At a minimum these "communes" should provide a basis for (a) mobilization of all available labour for infrastructural work (irrigation, embankments, roads, soil reclamation, etc.), (b) collective planning of land use, (c) planned diversification into non-agricultural activities, (d) a process of work-sharing and income-sharing that will make destitution impossible (associated with a programme for helping "excess" people to move out to an assured job), (e) a channel for a two-way flow of directives, information, requests, etc., relating to the process of national economic planning, and (f) a mechanism for the centralization and redistribution of the agricultural surplus.

Can any kind of empirical research tell us anything about the desirability of collectivization? To an extent, yes. For a given area, one can estimate, for example, the amount of infrastructural work that could be undertaken, the relative costs (even in purely economic terms) of having this work done by contractors and hired labour as against by mobilizing local people, and the (again purely economic) benefits one could expect. This would give one an idea of the purely economic benefits that one might derive from one aspect of the functioning of

the commune. A similar exercise could be carried out, I suppose, for the benefits from land use planning. The social and political aspects of the commune cannot be evaluated by these means. These are closely linked to the feasibility problem. I conclude with some remarks on this.

X. THE POLITICS OF FEASIBILITY AND THE FEASIBILITY OF POLITICS

Which if any of the policies outlined above, separately or in combination, are feasible in Bangladesh ? What are the political and administrative conditions of their implementation ?

The question of feasibility can be put more starkly as follows : what classes or strata would gain by these measures, and which would lose ? Are these gains and losses transparent to the agents ? And what is the relative power position of the gainers and losers ? Let us consider the three policies we discussed above in the light of these questions.

1. Abolition of sharecropping : while I argued above that the gains and losses from this step are in fact problematic, to the agents themselves they might seem quite clear. The "feudal lords" would certainly lose. The tenants would gain, at least immediately, if the sharecropped land reverts to them. Capitalist farmers would probably gain.

Now the tenants have no power. So the issue will be decided by the relative power of the feudals vs. the capitalists. However, it remains to be established that these classes, who are analytically distinct in a mode of production analysis, can also be treated, at a more concrete level, as distinct classes with distinct class interests. Otherwise things would happen as if they in fact constituted one class, and the issue would be decided by the perceived gain or loss to this composite class. It is quite possible that in fact, in the context of Bangladesh, the feudal and capitalist modes are not in conflict, but mutually reinforce each other, and that hence these two dominant classes (who perhaps constitute distinct classes only at the level of the economy) have essentially convergent interests.

I think we may infer that on either point of view, the abolition of sharecropping would be resisted by the dominant classes in rural

Bangladesh. Such a step could therefore only be undertaken by a government which has formed a firm alliance with the non-dominant classes in the countryside—with the small farmers and the landless. Such an alliance can only be formed through a long process of common struggle—certainly neither through military-bureaucratic rule nor through the empty rituals of parliamentary democracy.

It is highly unlikely that the dominant class at the national level, the dependent urban bourgeoisie, would ever feel the need for such a struggle and such an alliance, or would be permitted to contemplate it.

2. Identical considerations apply for effective ceiling legislation. Here the issue is in fact simpler, since an effectively implemented ceiling would hit both feudal and capitalist classes.

3. The commune can only represent a culminating point for the phase of class struggle in which abolition of sharecropping and ceiling legislation may constitute important turning points. The question of the feasibility of communes in Bangladesh is therefore homologous with the question of the feasibility of the socialist revolution in Bangladesh.

On this last I do not feel competent to pass judgement, since I am not a participant in, not even a very assiduous observer of, the class struggle in Bangladesh. What superficial acquaintance I have with it certainly does not induce optimism. The small and indeterminate industrial working class, the prevalence of factionalism, regionalism, and religiosity in the countryside, the abysmally low level of leftist intellectual work, the fragmentation of the left, and for significant section of the left a hypnotic subservience to Maoist mythology, the increasing and enthusiastic involvement in the world capitalist system—all this may pardonably make one despair. Perhaps the only feasible politics in the near future is the politics of waiting and “patiently explaining”. Perhaps I should make it clear that I labour under no illusion that I am myself doing just that. For the “explanation” has to be a dialogue with the masses, and the “waiting” is in fact a period of preparation, organization, and vigilance—vigilance not only against state repression, but mainly against the kind of despair that is the common breeding ground of left adventurism and right opportunism.

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The Manufacturing Sector of Bangladesh—An Overview

by

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The paper attempts to analyse the course of development in the manufacturing sector of Bangladesh over the past three decades. Two distinct time periods, viz, pre-liberation and post-liberation periods, are distinguished for the purpose of analysis. The paper identifies the basic philosophies behind the industrialisation strategies in the two periods and analyses the manner in which actual policies pursued have been shaped by these philosophies as well as the impact of these policies on the achievements and failures of this sector. Some policy suggestions are made with respect to certain major weaknesses of this sector being felt at present. The paper concludes with some observations on the kind of general socio-political changes that would be required in order to develop a viable manufacturing sector which will also be best equipped to serve the interests of the common people.

I. INTRODUCTION

The manufacturing sector, both large and small scale, is a relatively minor sector of the Bangladesh economy. It accounts for 10-11 per cent of the GDP, and absorbs only about 6 per cent of the total labour force. It is generally accepted that there is a need for expanding this sector. There are a number of well-known arguments in favour of this strategy. Import substitution, domestic availability of raw materials, higher value added in manufacturing, the inherent instability of world demand for primary products such as raw jute, forward and backward linkages, and employment of surplus labour from agriculture, are among them.

Given its small weightage in the national economy, there can be no disagreement that the manufacturing sector cannot be expanded fast enough

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in the foreseeable future to make a real impact on the growth of the national economy if agriculture languishes with a low rate of growth. Indeed, it is agriculture which holds the key to the pace of economic growth in this country. But the manufacturing sector can and should play a strong and expanding role in the process.¹

The purpose of this paper is to trace the history of industrial development that has taken place in this country over the past 30 years or so ; make a general evaluation of the present situation ; and raise some policy issues and propose some policy directions relating to planning for industrial development in Bangladesh.

II. INDUSTRIAL DEVELOPMENT DURING PAKISTAN PERIOD, 1947-71

The Way it Began

In 1947, the area, which is now Bangladesh, was a primary producing region with little modern industry. There were only a handful of large-scale industrial units—a few cotton textile mills with 99,000 spindles and 2,583 looms ; a few sugar mills with a total capacity of 39,000 tons ; one cement factory with a capacity of 100,000 tons ; and a number of jute baling presses [7]. Productive activities of the area included a variety of small and cottage industries. In 1949/50, contribution of the manufacturing sector to the GDP was only about 3 per cent—large-scale enterprises contributing just over half a per cent [9, p.167].

The Government of Pakistan announced the first Statement of Industrial Policy in April 1948 and further clarified it in November of that year. Although the statement was broad and general it contained the two basic elements of industrialisation policy pursued over the following two decades : (i) industrialisation was to be achieved through private enterprise and (ii) government was committed to promoting industrialisation through suitable and active intervention. Thus the government was prepared almost since

¹In the foreseeable future, the manufacturing sector can play an essentially supporting role. In the long run, this sector may assume leading role, but when this may take place cannot be foreseen now.

partition to provide effective financial and other support to private entrepreneurs interested in establishing industrial enterprises. But as Pakistan initially lacked industrial entrepreneurs, the response from the private sector was naturally rather limited at first.

There was, however, one group of potential entrepreneurs ; and they soon realised that there were immense opportunities in the industrial field. They were willing to undertake industrial investments in spite of the uncertainty surrounding the political and economic future of the country in the early years.² This group consisted of those few Muslims who came to Pakistan from India, Burma or East Africa where they had owned small and medium-sized industrial and trading enterprises. They brought with them modest accumulations of capital and, in some cases, technical skills and entrepreneurial experience also. Most of them settled in West Pakistan, particularly in Karachi which was then the capital of Pakistan, and began to invest there. This was so mainly for two reasons. First, these immigrants had closer linguistic and cultural affinities with West Pakistanis and, secondly, they knew that, as far as obtaining quick and timely government decisions was concerned, they would be better placed by being nearer the capital and having easier personal access to government offices. In addition, there were also some West Pakistani traders who made fortunes during the Korean boom and were looking for opportunities for industrial investment. Both the groups of potential investors were reluctant to undertake industrial investment in East Pakistan. And East Pakistan lacked potential investors either of industrial or of trading background as the Hindus who controlled these activities in the province left the country on independence. As a result, East Pakistan faced more formidable problems than West Pakistan in securing the establishment of factories. However, it was one of the immigrant industrial families, the Adamjees, which was eventually convinced that attractive profit opportunities existed in jute manufacturing in East Pakistan. By 1949 the government had approved a scheme prepared by the Adamjees for setting up three jute manufacturing units of 1,000 looms each.

²This group soon emerged as vigorous entrepreneurs and played the leading role in the rapid industrial growth that Pakistan achieved primarily through private enterprise during the 1950's and the 1960's. A detailed analysis of the development of private entrepreneurship and rapid industrial growth in Pakistan can be found in Papanek [19].

It also gave its full and active cooperation to the Adamjees in all respects in addition to taking an equity interest in the project.

Thus the industrial development in East Pakistan started with jute manufacturing. It should also be noted here that the jute manufacturing industry was started in East Pakistan by a successful combination of government patronage and private initiative, a phenomenon which continued to play a crucial role in the establishment of industrial units in the country over the next two decades. Of course the continuing government intervention of that nature and extent in support of private enterprise allowed the bureaucracy to play a crucial role in regulating not only the industrial activities but also their ownership.

The Owners and Entrepreneurs

The main thrust of Pakistan's industrialisation policy remained basically the same throughout the two decades : that industrialisation was a fundamental goal of the government, that it was to be achieved primarily through private enterprise, and that the government would pursue policies and carry out activities designed to develop private entrepreneurs and create a favourable environment within which they could undertake industrial investments. Thus over the years, the government developed the infrastructure that facilitated industrial investment within the framework of its over-all and sectoral development plans. But, more important, the government also carried out certain policies and activities which played decisive roles in Pakistan's rapid industrialisation by providing extremely generous public patronage and protection to private industrial investments. We discuss these government policies and activities below.

In order to enable potential entrepreneurs without sufficient capital to start industrial enterprises, the government was prepared to extend credit to them on an ad hoc basis before the establishment of formal credit institutions [19]. The first formal credit agency, the Pakistan Industrial Finance Corporation (PIFCO), was started in 1949 to provide credit to enterprises after they had been established. But PIFCO played practically no role in the development of industries in East Pakistan. Indeed, it was the provision of finance to help the establishment of new enterprises that was the primary need, but that was outside the scope of PIFCO. In 1961 it was converted into the Industrial Development Bank of Pakistan (IDBP) and was allowed

to make loans for the establishment of new enterprises as well as to existing enterprises. Another financial agency, the Pakistan Industrial Credit and Investment Corporation (PICIC), was established in 1957 to make loans and provide equity investment for the expansion of existing or the establishment of new enterprises and also to undertake promotional activities.

But the agency which made the most important contribution to the development of industries in East Pakistan was the Pakistan (later East Pakistan) Industrial Development Corporation (PIDC, later EPIDC). The PIDC was established in 1950 to undertake promotional activities for industrial development, and to provide equity finance and managerial support to private entrepreneurs to enable them to start and operate industrial enterprises.³ It was required to withdraw its equity interest and managerial responsibility as soon as the private investors became capable of taking them over. It also was to develop industrial enterprises in the public sector in cases where private initiatives were lacking, with a view to transferring the public undertakings to the private sector after their profitability had been established. The role of PIDC as promoter of industrial development was particularly significant in East Pakistan where the lack of private industrial initiatives was particularly critical.

With effect from 1 July 1962 the PIDC was divided into two separate entities : the West Pakistan Industrial Development Corporation (WPIDC) and the East Pakistan Industrial Development Corporation (EPIDC), to function exclusively in West and East Pakistan respectively. The EPIDC further intensified efforts to accelerate the rate of industrial development in East Pakistan, and achieved substantial successes in that regard in spite of its failure to implement some of the conceived projects.

The private investors in Bangladesh during the 1950's and the early 1960's had been mostly (West) Pakistanis. Their advent and progress as industrialists in Bangladesh were facilitated by government policies of providing generous assistance and support to private investors in establishing and running factories. Indeed, the country was in (West) Pakistani

³In addition to PICIC and EPIDC equity participation, in the 1960's, investors could also raise equity finance from two other government-sponsored institutions ; the National Investment (Unit) Trust set up in 1962 and Investment Corporation of Pakistan set up in 1966.

political and bureaucratic control, and it is also possible that there was a conscious and deliberate (West) Pakistani political and bureaucratic hand in promoting (West) Pakistani ownership of industries in Bangladesh.

By the early 1960's, however, some Bengalees began to show entrepreneurial interest. These potential Bengalee entrepreneurs were individuals who had until then (usually since partition) been engaged in trading or small-scale industrial activities and had by then accumulated some capital and developed some aptitude for entrepreneurship. They had very limited financial resources and managerial abilities. But the EPIDC vigorously encouraged and supported them.

The predominance of industrial investment in Bangladesh by (West) Pakistanis had given rise to strong resentment among Bengalees, and its continuation was no longer politically acceptable by mid-1960's. It was basically in the height of this political expediency that, by early 1960's, the government became particularly concerned about developing Bengalee entrepreneurs to carry out industrial investment in Bangladesh. A measure of government concern to develop Bengalee entrepreneurship can be seen from the following facts. On average, private Bengalee investors contributed about 24 per cent of the investment in the establishment of jute mills while 19 per cent came from public equity and 58 per cent from public loan advance; and in fact, in some cases, the share of the Bengalee entrepreneur in the finances need to set up a jute mill was as low as 10 per cent [20]. As a result Bengalee entrepreneurship began to develop from about mid 1960's, and a significant progress was achieved in this regard by the time of Liberation. But the Bengalee industry still remained under the dominance of Pakistanis.

In large-scale production, Bengalee entrepreneurs remained mainly confined to jute manufacturing and cotton textiles. And as things stood at the time of Liberation, Bengalees owned about 34 per cent and 53 per cent of fixed assets in jute and cotton textile industries respectively. Outside these two industries, there were only six Bengalee owned enterprises with assets above Tk. 2.5 million. The newly developing Bengalee entrepreneurs, it appears, were more interested in small and medium industries. However, even here, Bengalee ownership accounted for about 20 per cent of fixed assets by the time of Liberation.

Besides promoting and assisting private investors, PIDC/EPIDC also established industrial units in the public sector, which were to be transferred to the private sector after their profitability had been established and when private investors were available to take them over. Upto the time of Liberation, public sector ownership existed mainly in the heavy engineering and chemical industries, in the paper, cement and steel industries, where there were a few units in each case, and in sugar industry. There were also a few publicly owned units in industries such as jute manufacturing and cotton textiles. As of 1969/70, public ownership accounted for about 36 per cent of the fixed assets in the modern industrial sector [20].

Policies Affecting Profitability

We now turn to the policies which influenced the growth of industries via their influence on profitability. First, the industries enjoyed concessions aimed at the promotion of industrial growth, including tax holidays, accelerated depreciation allowances and exemption of reinvested income from both corporation and personal income taxes. There were also the exemption of exports from domestic sales and excise taxes, income tax rebates on the portion of income earned from exports and other measures aimed at the promotion of exports [17]. Second, and more important, heavy protection was given to the industries in the forms of underpricing of inputs and overpricing of outputs (in terms of domestic currency) via the import licensing system and export bonus scheme.

Foreign exchange was made available at the official exchange rate to industries through import licensing and export bonus arrangements for the import of machinery, spares and other importables. But the official exchange rate always substantially overvalued the domestic currency [14] so that the industry paid much less than the effective price in domestic currency for its imported inputs. The export bonus scheme heavily subsidized the export industries, the jute manufacturing industry being the major beneficiary. The scheme played such an important role in the development of jute manufacturing industry in Bangladesh, her largest industry, that its implications should be discussed. But, before proceeding to that subject, we briefly note relevant aspects of the general import licensing system.⁴

⁴A fairly detailed description of the system is available in Stephen R. Lewis Jr. [17].

An elaborate import licensing system, with modifications from time to time, was in operation in Pakistan from January 1953. The system basically worked as follows in respect of imports for industrial purposes. Once an industrial project was approved by the government, the manufacturer was granted the necessary licences for the unit. The owner was also registered as a quota holder (or industrial importer) which granted him regular access by means of industrial licences to imports of spare parts and raw materials necessary for use in his own enterprise. A quota was an entitlement to the import of a certain input, calculated essentially from the installed capacity of the enterprise concerned.

In addition to their regular import licensing entitlements, exporters were also granted special import licences throughout the 1960's. This scheme was known as export performance licensing, and the purpose was to enable exporters to import additional spare parts and raw materials in order to allow and encourage greater production and exports.

The export bonus scheme was introduced in January 1959. The exporter of a commodity entitled to bonus surrendered his foreign exchange earnings to the State Bank of Pakistan. He received the rupee equivalent, and in addition a voucher which entitled him to purchase at the official rate foreign exchange equal in value to a certain percentage of the amount earned (20 per cent, 30 per cent or 40 per cent admissible at the time in question, depending on the commodity exported). Bonus vouchers were actually issued for exports of all goods except raw jute (until July 1970), hides and skins, rice and raw wool. A voucher was freely transferable. Its price, commonly known as the premium, was determined by the market. The voucher could also be utilised for obtaining foreign exchange (at the official rate) for use in (a) importing a wide range of commercial and industrial goods, (b) business travel abroad, and (c) opening and maintaining commercial offices abroad [1; 10].

On the import side, bonus vouchers acted as import licences for the import of goods on the bonus list (i.e., goods which were allowed to be imported through the use of bonus vouchers). As import licences, bonus vouchers had an advantage over regular import licences. It was possible to import goods immediately through the use of bonus vouchers, whereas in the regular import licensing system it was necessary to wait until the next shipping period (i.e., six-monthly licensing period) if licences for the

required imports were not held in respect of the current shipping period. Hence, "the bonus voucher system provided an excellent safety valve for those firms which might have run short of a critical spare part or raw material during a shipping period" [17, p. 30].

The bonus scheme, however, mainly influenced the growth of export industries through its impact on domestic currency receipts for exports thereby guaranteeing easy and quick profits. Because of bonus earnings the domestic currency receipts for one US dollar worth of exports was : $(1 + pb) r$, where p = premium rate, b = bonus rate and r = units of domestic currency receivable in exchange for one US dollar at the official rate. This meant that the exchange rate available for exports was higher (i.e., more favourable) than the official rate, the extent of the excess depending on the values of p and b at the time in question. The benefit enjoyed by the jute manufacturing industry, for example, was between 16 per cent and 22 per cent of the total rupee receipts from 1959/60 to 1966/67, and as high as 54 per cent to 63 per cent from 1966/67 to 1969/70 [3, p. 46].

An Overview of Achievement

From being negligible in 1947, the industrial base of Bangladesh reached a substantial level by the end of the 1960's. At constant 1959/60 prices, the manufacturing sector contributed Rs. 1,672 million (7.8 per cent) to the GDP in 1969/70, compared to Rs. 339 million (3.0 per cent) in 1949/50. The contribution of the large-scale industries was Rs. 783 million (3.7 per cent) and that of small manufacturing was Rs. 889 million (4.1 per cent, the corresponding figures for 1949/50 having been Rs. 69 million (0.6 per cent) and Rs. 270 million (2.4 per cent).⁵

The number of registered factories in 1968/69 was 3,130. Of this, 791 units were in textiles, 576 in chemicals, and 406 in food manufacturing—the three major industries [12 ; p. 165]. In addition, there were a large number of small non-registered enterprises, and a much larger number of cottage manufacturing units.⁶

⁵The figures shown here are from [9, p.167]. Somewhat different figures are reported in different sources. But our purpose is to show rough orders of magnitude, and for this any set of figures is good enough.

⁶A survey carried out in 1969 by the Bangladesh (then East Pakistan) Bureau of Statistics reported 330,400 industrial units in rural areas with assets worth below Rs. 0.5 million, of which, about 82 per cent was classified as cottage industries.

It may be noted that the full potential of the small and cottage industries for output and employment expansion remained largely unexplored. This was so in spite of the fact that the importance of small industries was emphasized in successive Five Year Plans. Small and cottage industries continued to suffer from serious handicaps such as lack of proper planning, antiquated methods of production, lack of skills, lack of knowledge about commercial and technical possibilities, capital shortage and dependence on money lenders. The East Pakistan Small Industries Corporation (EPSIC) which was established in 1957 to promote and support small industries in the country remained virtually ineffective.

In respect of the large-scale industrial sector, it should be noted that there were a number of problems. The establishment of factories were not always based on comparative cost advantage [18]; factor intensities in many industries were inconsistent with internal factor endowments i.e., they were more capital-intensive than they should have been given an abundance of labour and scarcity of capital [5] ; and most of the industries suffered from substantial underutilization of capacity [3 ; 22]. Also, while the industries generally enjoyed high private profitability, the social profitability was fairly low for most industries and too low in some cases to justify the expansion achieved by them [16].

The above deficiencies had their roots in the artificially distorted price structure and heavy protection available to industries because of the overvalued currency, the import licensing system, the export bonus scheme, high tariff protection, and other concessions enjoyed by the industries. When the currency was overvalued, the availability of foreign exchange for import of machinery and equipment made capital relatively cheap, and was primarily responsible for capital-intensive techniques adopted by industries. Heavy subsidy available through the measures mentioned above ensured good profits even for very inefficient producers, so that the industrialists could take a relaxed attitude towards productivity growth and improvement in capacity utilization.

It would seem in order here to explain the success of the export oriented jute manufacturing industry in expanding rapidly during the 1960's by sharply cutting into the Indian share of the world export market for jute manufactures. The share of Bangladesh in the export of jute manufactures

from Bangladesh and India increased from about 8 per cent in 1955/56 to about one half by 1969/70, while the total exports from the two countries remained virtually stagnant during the 1950's and again at somewhat higher level during the 1960's also. To be sure, the success was not achieved because of a real competitive edge of the Bangladesh industry over its Indian counterpart. If anything, the Indian industry probably had a cost advantage. The key to the success of the Bangladesh industry was the export bonus scheme which enabled her to undersell India by 7 to 23 per cent during 1960's and still earn attractive profits. It should be noted that India did not adopt any counter measures to enable her jute manufacturing industry to contain the inroads made by Bangladesh at her (India's) expense in world market for jute manufactures.⁷

The export bonus scheme also provided a mechanism of transfer of income from jute growers to manufacturers of jute goods. Exports of raw jute were not allowed any bonus facilities until July 1970, while exports of jute manufactures enjoyed a bonus of 20 per cent from January 1959 to March 1967 and of 30 per cent from March 1967 to July 1970, and were thereafter allowed only 10 per cent as against 35 per cent for jute manufactures. This differential treatment of raw jute exports provided protection to the jute manufacturing industry by (relatively) depressing the exchange rate for raw jute and, hence, depressing domestic prices for raw jute. This protection to the jute manufacturing industry represented a transfer of income to the industrialists from the poor jute growers in so far as higher exchange rate was received for the raw jute component in the exports of jute manufactures.⁸ It has been estimated that if raw jute exports were provided with same bonus facilities as exports of jute manufactures, the jute manufacturing industry would have lost in 1969/70, on average, about Rs. 208 per ton when depreciation is excluded and about Rs. 346 per ton when depreciation is included, in spite of bonus earnings [4].

⁷For further details, see [3], Chapter IV, Section IV. 3.

⁸In 1969/70, raw jute accounted for about 45 per cent of the cost of sales of jute manufactures excluding depreciation, and about 42 per cent of the cost of sales including depreciation, on average. If the same exchange rate was available to exports of raw jute as that enjoyed by exports of jute manufactures in 1969/70, the domestic raw jute prices would, as a result, have been higher by as much as 54 per cent. This would imply that raw jute cost of jute manufactures would have been higher by as much as 54 per cent [3],

III. DEVELOPMENTS IN INDEPENDENT BANGLADESH

The Changed Context

During the War of Liberation the manufacturing sector suffered widespread dislocation ; and there were also damages to buildings, and loss of equipment and tools, raw materials, spares and finished goods. Most of the industrial units restarted operation within a few months ; but there were various problems arising in consequence of the War of Liberation which affected recovery of their output.⁹ Most of these problems except the dearth of skilled workers and managers, should by now have long passed their Liberation War-linked disrupted phase.¹⁰ In so far as skilled workers and managers are concerned, the shortage is still quite significant in many industries.

Apart from the effects of war, problems associated with institution building following the nationalisation programme announced on 26 March 1972 also adversely affected the recovery of industrial output. The nationalisation programme brought in a radical change in the whole framework of industrial ownership, management and policy.

Also, soon after Liberation the Government of Bangladesh abolished the export bonus scheme and devalued the taka (the renamed unit of the domestic currency, which had been called the rupee in Pakistan days). The devaluation changed the value of the taka in terms of the pound sterling from 11.5 to 18.97. After further adjustments in the exchange rate brought about from time to time, the exchange rate stood at Tk. 25.40 per pound sterling on 3 December 1976—a devaluation of 121 per cent from the rate

⁹These problems included shortage of managers and skilled workers as a result of the exodus of (West) Pakistani skilled personnel and top factory managers ; labour unrest and indiscipline in the new political atmosphere ; shortage of power due to damage to the system during the War of Liberation, shortage of spares and inputs due to disruption of local production and inadequate and untimely import authorisation ; shortage of working capital in an uncertain financial climate ; loss of market in (West) Pakistan and elsewhere because other suppliers captured them when supplies from Bangladesh were disrupted during the war ; lack of transportation facilities due to dislocation and damages caused in the war ; and inadequate flow of maintenance imports due to foreign exchange scarcities, inexperience of new industrial importers in handling cumbersome licensing procedures etc.

¹⁰For further details on that phase one may refer to the First Five Year Plan of Bangladesh [12].

prevailing before the first devaluation. The effective exchange rate under the export bonus scheme was about Tk. 18 to the pound sterling in the late 1960's ; compared to that also the current value of taka is significantly lower.

The abolition of the export bonus scheme meant that export industries lost the subsidy that fostered and nurtured them during the 1960's. It also meant that industries lost a mechanism of getting industrial imports immediately without having to wait for the next shipping period in the event of their running short of such importables during a shipping period. And, of course, a devalued taka has meant increased costs of industrial imports, and also of locally produced spares and intermediate inputs as a consequence of increased costs of imported materials used in their production. It has also caused increases in domestic prices of raw jute, a major export item, as a result of the consequent increases in the taka value received for exports of raw jute.

All the nationalised industries other than jute manufactures are essentially domestic market oriented. Hence, it should be clear in the light of the above analysis that both the abolition of the export bonus scheme and a devalued taka have clearly affected these industries adversely. In the case of export-oriented jute manufacturing, since the second devaluation, there has been a gain over the pre-Liberation period (inclusive of the bonus earnings), varying from taka 6 to 12 per pound sterling worth of exports, because of changes in the exchange rate. But a devalued taka has adversely affected the cost of production of jute manufactures as a result of the consequent higher prices of raw jute in the domestic market.

In what follows we shall discuss aspects of (a) the performance of the manufacturing sector, (b) the management of the nationalised industries, (c) the private sector, and (d) the small-scale and cottage industries.

Trends in Output and Capacity Utilisation

Figures on output are available for the modern industrial sector ; they are not available for the small and cottage industries. However, contribution to GDP at constant prices is available for large-scale and small-scale¹¹ industries separately, as shown in Table I. The contribution, in

¹¹Although the sub-sector is designated small-scale industries in the data source, it apparently includes cottage industries also.

real terms, as shown in the table, of both the sub-sectors has increased over the years ; that of the small-scale industries has increased somewhat faster. But the contribution of small and cottage industries can be significantly greater than is indicated by the reported figures. A pilot study has found that in Chandina thana of Comilla district and Tangail thana of Tangail district the number of such industrial units is substantially larger than is suggested by official records [6].

TABLE I
CONTRIBUTION OF INDUSTRY TO THE GDP AT CONSTANT
PRICES OF 1972/73

Year	In Million Taka			Per Cent of GDP		
	Large-scale	Small-scale	Total	Large-scale	Small-scale	Total
1969/70				3.7	4.1	7.8
1972/73	1,870	1,025	2,895	4.3	2.3	6.6
1973/74	2,224 (119)	1,178 (115)	3,402 (118)	4.5	2.4	6.9
1974/75	3,031 (162)	2,450 (239)	5,481 (189)	6.0	4.8	10.8
1975/76	3,268 (174)	2,619 (256)	5,857 (202)	5.6	4.5	10.1
1976/77	3,624 (194)	2,973 (291)	6,597 (228)	6.2	5.0	11.2

Source : Bangladesh Bureau of Statistics, *Statistical Pocket Book of Bangladesh 1978*, except for 1969/70 ; figures for 1969/70 are from Alamgir [9].

Note : Figures in brackets are indices with 1972/73 as the base.

Table II presents indices of production for selected large-scale industries in Bangladesh for the period 1969/70 to 1976/77. In a number of industries, output in 1976/77 was much larger than the 1969/70 level.¹² Indeed, in most of the cases, the increase in output over the previous year is most pronounced in 1976/77 compared to earlier years.

¹²These include fish and sea food (363 per cent) ; ice manufactures (192 per cent) vegetable oils (285 per cent) ; sugar (59 per cent) ; pulp, paper and board (30 per cent) ; fertilizer (275 per cent) ; and cement (542 per cent).

TABLE II
INDICES OF INDUSTRIAL PRODUCTION (BASE : 1969/70=100)

Groups of Industries	Years						
	1969/70	1972/73	1973/74	1974/75	1975/76	1976/77	
1. General Index	100	75.00	89.76	81.33	86.93	97.13	
2. Food, Beverage and Tobacco Manufacturers :							
(i) Vanaspati	100	88.00	78.10	85.80	72.00	92.08	
(ii) Fish and sea foods	100	143.09	190.00	167.50	305.00	462.70	
(iii) Ice manufacturers	100	102.50	350.00	250.00	257.50	271.66	
(iv) Vegetable oils	100	179.66	329.99	156.00	280.00	385.27	
(v) Bakery products	100	91.00	90.00	94.00	84.00	88.65	
(vi) Sugar	100	21.59	100.00	111.40	98.86	159.81	
(vii) Tea	100	81.97	94.20	95.00	100.42	107.74	
(viii) Beverages	100	68.00	64.00	66.00	60.00	56.80	
(ix) Tobacco manufacturers	100	62.95	66.81	58.70	66.93	64.32	
3. Textiles :							
(i) Jute	100	80.27	90.67	78.50	86.35	85.10	
(ii) Cotton	100	99.61	92.88	94.00	89.19	84.45	
(iii) Rayon	100	71.15	76.92	58.80	42.30	68.67	
4. Paper & Paper Products :							
(i) Pulp, paper & board	100	66.67	71.11	91.00	83.30	130.16	

(Contd.)

TABLE II (Contd.)

Groups of Industries	Years					
	1969/70	1972/73	1973/74	1974/75	1975/76	1976/77
5. Chemical and Rubber Manufactures :						
(i) Industrial chemicals	100	108.33	83.34	77.92	85.01	103.67
(ii) Fertilizer	100	213.70	283.75	74.68	195.94	274.73
(iii) Disinfectants and insecticides	100	10.00	20.00	20.00	10.00	41.05
(iv) Matches	100	43.47	47.82	47.80	53.04	56.03
(v) Tyres and tubes	100	116.66	100.00	116.60	100.00	105.86
6. Manufactures of Non-metallic Minerals :						
(i) Glass	100	116.00	92.00	92.00	90.00	93.33
(ii) Cement	100	60.00	100.00	170.00	300.00	642.08
7. Basic Metal Industries :						
(i) Iron and steel	100	51.46	85.87	79.40	77.64	88.08

Source : Bangladesh Bureau of Statistics ; Statistical Yearbook of Bangladesh, 1975 ; and Statistical Pocket Book of Bangladesh, 1978.

But the two largest industries, jute manufacturing and textiles, have tended to lag behind. A number of relatively small industries such as beverages, tobacco manufactures, matches and bakery products have also performed poorly.

Regarding overall industrial output, it appears that after reaching about 90 per cent of the 1969/70 level in 1973/74, the output was poorer in the following two years. The recovery since 1973/74 has, however, been steady. But production level in 1976/77 was still somewhat lower compared to 1969/70.

Not only that the overall expansion in industrial output has been far from satisfactory, but it is suspected that productive efficiency is also currently lower in most of the industries than in 1969/70. The social return of the industries is generally likely to be low, probably even negative in many industries meaning that their production is a net reduction in society's real income. Sugar, cigarettes and paper were found to have negative social profits even in pre-Liberation days [16].

Balancing, modernization and replacement (BMR) of the existing units and completion of on-going projects have been the major thrust of investment strategy in the period after Liberation in several industries such as jute manufacturing, paper and board, engineering, shipbuilding and sugar. In industries such as textiles, iron and steel, chemical, petrochemical, food and allied, and mining and those based on minerals, creation of new capacity has been the more important objective [12]. The industrial investment programme envisaged in the First Five Year Plan of Bangladesh has remained substantially unfulfilled mainly because of non-availability of external finance as planned. We have failed to obtain meaningful information on the actual investment that has taken place over the years since Liberation in different industries.¹⁸ But available evidence clearly indicates that in real terms progress has fallen far short of what was planned. Also, it is clear that since Liberation virtually the whole of the public

¹⁸We succeeded in collecting some financial figures relating to investment in industries for the past few years. But they could not be meaningfully interpreted in the absence of appropriate domestic and foreign price deflators. We, therefore, refrained from reporting these figures,

sector allocation for investment in industry has gone to large-scale industries ; small and cottage industries have received only about 3 per cent of the total.

Available evidence suggests that capacity utilization level in most of the industries has tended to be low ; and in some industries it is reportedly as low as 15-20%.¹⁴ The present level of capacity utilization should be the crucial consideration in production and investment planning in industries. Any proposal for capacity expansion in industries should be carefully evaluated with reference to their utilization levels.

In some cases, the question of capacity contraction may be the more relevant economic issue. For instance, the jute manufacturing industry which mostly produces traditional jute goods such as hessian and sacking for export has been producing less than 500 thousand tons in 1973/74. There are now 25,735 looms in the industry. In 1969/70, the installed loomage was 21,483 and the output was 561 thousand tons. The world import demand for traditional jute goods has remained more or less stagnant since the early 1960's [3], and available evidence suggests that it is unlikely to expand significantly in the foreseeable future. It would appear, therefore, that scope of export expansion in traditional jute goods for Bangladesh is limited. It is only by cutting sharply into the share of other suppliers that she can achieve any significant expansion. But, given the present very high cost conditions in the industry, it cannot expand exports by underselling other suppliers in the international market without massive subsidy ; and such subsidy to the industry (traditional products) may not be justified on social return considerations. Also such a strategy may face retaliatory measures from other suppliers, and may not, therefore, lead to export expansion.

Now, only if the 1969/70 capacity utilization level can again be achieved, the present installed capacity will yield over 670 thousand tons of jute goods, about 200 thousand tons more than the average output during 1974/75—1976/77. And there was substantial underutilization of capacity

¹⁴See [3] and [8] for evidence on capacity utilization in jute manufacturing, sugar, engineering and shipbuilding industries.

in 1969/70 [3]. Hence, in relation to the demand for output and the present level of its capacity utilization the industry is carrying considerable excess capacity ; and it will probably continue to do so if the present capacity is maintained. One may argue, therefore, that reduction of the industry's capacity should make economic sense.

But a decision to reduce capacity should not be taken lightly. All its possible implications should be thoroughly and carefully examined to establish the best possible step under the circumstances. Again, while reduction of capacity may be a desirable step in the case of traditional jute products, there should be considerable scope of expansion of capacity in products such as jute carpets. Capacity expansion will also be called for in respect of new product lines with good commercial prospects.

It may be noted here that very little industrial capacity expansion has been envisaged in the Two Year Plan [13] —a desirable step. Only 12 per cent of the total allocation for the industrial sector will go to new projects. But through completion of on-going projects additional capacity will be generated in many industries. And one wonders if the abandonment of some of these would not have been less costly to the society in the ultimate analysis than their proposed completion.

The Nationalisation Programme

In Bangladesh, as in most other countries, service industries such as electricity, gas, post and railway have always, both before and after Liberation, been in the public sector. In the Pakistan period, other industrial enterprises were largely in the private sector. It has been noted earlier that although, at the time of Liberation, a number of enterprises in these industries, accounting for about a third of the total fixed assets, was publicly owned, attempts were being made to disinvest many of them in keeping with the policy of pursuing industrialisation essentially through private enterprise.

The announcement of the nationalisation programme on 26 March 1972 meant that the private-enterprise industrialisation policy of Pakistan was largely abandoned. Nearly 90 per cent of fixed assets in modern

industrial sector¹⁵ was brought under public ownership and control [21, Chapter XIX].

In Bangladesh there was a new phenomenon following Liberation, which weighed heavily in favour of large-scale nationalisation of modern sector industries. This was the question of enterprises abandoned by their Pakistani owners who left the country. As the abandoned enterprises, in terms of fixed assets, accounted for about two-thirds of the jute manufacturing industry, about half of the cotton textile industry and most of the remainder of the large-scale manufacturing sector, the question of putting them back into operation was extremely urgent. Without losing time the government took over the management of all abandoned units and took steps to put them back in operation with an appreciable measure of success. On 26 March 1972 the government formally took over the ownership of all industrial assets abandoned by Pakistanis; and nationalised all units in the jute manufacturing and cotton textiles industries, thereby also taking over the Bengalee-owned units in these two industries.¹⁶

Regarding abandoned enterprises, it was clearly a situational necessity for the government to take them over for management. They were enemy property, and it was government's responsibility to take charge of them and put them back into operation. Taking over of their ownership was a logical extension. In so far as Bengalee-owned enterprises in jute and cotton textiles industries is concerned, their nationalisation was in fulfilment of the manifesto commitment of the Party in power, the Awami League; it was also claimed to be a step towards removing foundations from which big capitalists might emerge in the country. But

¹⁵Modern industrial sector is assumed to comprise all units classified under 2 (j) and 5 (i); 2 (j) covers units employing 20 or more persons, and 5 (i) covers units employing 10 or more persons but using power.

¹⁶It may be noted here that jute manufacturing, cotton textiles and sugar were the only industries which were formally nationalised; all the sugar mills had already been in public ownership though. Although units under public control in other industries were not formally nationalised, there has been operationally no difference between them and the formally nationalised ones. The nationalised sector consists of both the formally nationalised units and those which are not formally nationalised but of which the ownership control has been taken over by the government.

the nationalisation programme was a hasty act, without a clear vision as to the goals to be pursued through the programme, and even without an assessment of assets and liabilities and other basic characteristics of the units nationalised. Thus the nationalised management of industries began on a shaky ground in terms of basic management information as well as purposes.

The system of the nationalised industries in Bangladesh is essentially a three tier system ; the minister in-charge, the sector corporation and the enterprise management. While the minister in-charge has the overall governmental responsibility for a nationalised industry, it is the relevant sector corporation that runs it. Enterprises which are the productive units are owned by respective corporations and run by enterprise managements under the control, coordination and supervision of the corporation. The author has elsewhere [2 ; 3] discussed the management system in details. It will, however, be useful to note here some of the important points (details can be found in [2 ; 3]) and recent developments:

1. The powers and responsibility of the different tiers have not been clearly demarcated ; the accountability cannot, therefore, be properly established and implemented.

2. The corporations are organized on regular civil service lines. They are also subject to a very large measure of bureaucratic control by the controlling as well as other ministries within whose purview they come at one point or another. Hence, flexibility and quickness which are inalienable characteristics of the decision making process in production management are sacrificed to a large extent.

3. It is the enterprises which should have real authority for decision making and implementation as they are the productive units. But very little authority has been delegated to the enterprise managements.

4. Recently, as a step towards strengthening the enterprise managements, the concept of enterprise managements board has been introduced ; it generally consists of the enterprise chief executive, and representatives of the corporation, controlling ministry, Ministry of Finance and bankers. Such boards have so far been appointed in jute

manufacturing and cotton textiles industries, and are likely to be set up in other industries also. These boards have been granted somewhat wider powers compared to those available to enterprise managements headed by managers or general managers. But it would appear that this has not meant a significant improvement in the authority and operational freedom of individuals whose responsibility it is to run the enterprises. The chairman of an enterprise management board is usually a senior official of the corporation head office nominated on it,¹⁷ so that whatever delegation of authority there is from the corporation to the board, the board itself has remained under strict control of the corporation. There has been very little decentralisation of authority to the enterprise chief executives ; and it is they who should have real authority in respect of running the enterprises.

5. Appropriate criteria have not been established for evaluating the performance of the nationalised industries. In the circumstances, market profitability is being used to judge performance of the nationalised industries. But since nationalised industries are constrained to follow government regulations in matters of employment, procurement, sales, pricing etc., and cannot act freely according to the dictates of market signals as the private sector, their performance cannot be measured by the yardstick of market profitability.

6. Nationalisation meant direct government responsibility for production. But the government, which had traditionally performed civil and military functions as its regular areas of direct responsibility with mainly regulatory and promotional concern in the field of production, failed to realize properly the dimension and intensity of direct production responsibility undertaken by it under the nationalisation programme. This has been to a large extent responsible for lack of concern on the part of the government to tackle the persistent problems such as ineffective corporation and enterprise control structure, the lack of effective planning and programmes for personnel development, and the absence of appropriate policies regarding labour, pricing and incentive systems.

¹⁷In a few cases in the cotton textile industry, enterprise chief executives have been appointed chairmen of their respective boards, which in theory is a better arrangement.

7. Above all, it should be noted that the policy foundation of the nationalisation programme has continued to remain shaky, as its socio-political purposes have not been clearly defined. As a result there has been no attempt to introduce participatory management for the benefit of all those working in these industries as well as for the society at large. Indeed, the nationalisation programme seems to have transferred the industries from private capitalism to a form of state capitalism.

8. In view of the above it would be rash to condemn the nationalised sector if it has failed to perform satisfactorily. It is only fair that the sector gets a chance to work for a sufficient length of time with its purposes clearly defined and under appropriate policy and institutional framework before one makes a judgement as to whether nationalised management of industries can be efficient in this country or not.

The Private Sector

As a consequence of the nationalisation programme, the share of private sector in the fixed assets of the modern industrial sector came down from about 64 per cent to only about 10 per cent ; and the situation has since remained about the same. In terms of the number of units, however, the private sector still remains predominant. Nearly 90 per cent of the registered factories numbering over three thousand is in the private sector,¹⁸ naturally they are mostly small-scale. In addition, the large number of unregistered small-scale and cottage industrial units are in private hands. When these are taken into account, the contribution of the private industrial sector to GDP may be more than that of the nationalised industries. Hence, though sharply reduced from what it was before nationalisation, the private sector still has at least an equally important role as the public sector in the industrial output of the country.

¹⁸As of 26 March 1972, there were 2,659 units (87 per cent) in the private sector, while the number of units in the public sector was 392 (13 per cent). Only 27 of the private sector units had fixed assets exceeding taka 1 million and only a handful had fixed assets of over 2.5 million [21, Chapter XIX].

The most fundamental implication of the nationalisation of industries for private capitalism in Bangladesh is its virtual elimination from large-scale industrial ownership. Indeed, as noted earlier, these industries in the Pakistan period were highly profitable to their private owners because of the heavy protection they enjoyed ; but they were generally inefficient with low, in some cases even negative, social return. It would seem reasonable to argue that the private sector would have found it hard going in the period after Liberation even with the same level of government patronage and protection as had been available to it before, because of its having to cope with the additional problems and adverse factors in this period (noted earlier) than before. It could have survived in the later period only if profits were sponsored by the state ; and one should find the idea of state-sponsorship of profits for the so-called industrialists totally unacceptable. The above argument should provide a strong justification for the removal of private ownership of large-scale industries in Bangladesh.

But, it should be noted that the decision to nationalise large-scale industries was not actually taken on the basis of the above argument. The main argument on which it was based is that nationalisation of the industries would create conditions favourable for the eventual establishment of a socialist society ; and when socialist transformation of the economy is a national goal, nationalisation of large-scale industries should be a natural policy decision.

The dethroned capitalists naturally could not accept the nationalisation decision with equanimity. They soon started demanding their enterprises back. Also a new wealthy group of people soon emerged with huge amounts of finance capital accumulated from sources such as import trade, domestic wholesale business and smuggling ; they began to take interest in industrial investment to increase their economic strength and also to legitimise it if secured illegally. In addition, the private enterprise had its supporters among the then ruling political leaders, who usually operated in a subtle way in order not to be seen to be in open clash with the constitutional commitment to socialism. The combined pressure from these various groups soon succeeded in starting a process of policy changes favouring private industrial enterprise. Thus, the private investment ceiling which was fixed at Tk. 2.5 million in January 1973

was raised to Tk. 30 million in July 1974, and to Tk. 100 million in December 1975.

The present government has carried further the process of policy changes favouring the private sector and away from socialist transformation of the productive system. It is contended that the private industrial investments, both purely domestic and joint ventures with foreign private capital, have a crucial role to play in the industrial development of the country. It is also argued that private enterprise will generate efficiency in production and hence surplus for reinvestment. But, as pointed out earlier, in Pakistan days Bengalee industrialists were dependent on state patronage and protection for their survival and profits ; and there is no reason to believe that they can survive on their own now ; they may in fact, again as argued earlier, be in need of even heavier state patronage and protection in order to survive and prosper. It should also be noted that the private capitalists will not be able to stand on their own feet without bank loans ; and since the banking system (apart from foreign banks) is now publicly owned, borrowings by private capitalists from the nationalised banks for acquiring and running industrial enterprises will also be public assistance to private sector, which was not so in Pakistan days. Indeed, a policy of developing a private capitalist class under state sponsorship will clearly run counter to the principle of economic and social justice, as not only that it will create a state-sponsored privileged class but it will also impose sacrifices on other sections of the population.

Again, even if it were true that Bengalee private entrepreneurs would be able to generate surplus, it will be socially undesirable to allow a major role to the private enterprise in the industrialisation process. The private enterprise system generates inequalities in income and opportunities and breeds and sustains unequal power structure.

In fact the role of the private sector in the economy cannot be defined without reference to the kind of society to be developed. If socialism, meaning an exploitation-free society with economic and social justice, is the national goal, then the private sector can at best be allowed a marginal role to play. A completely socialist system would demand nationalisation of all means of production. However, in the intermediate

period, as the society is in the process of transformation, the private sector can have a useful and active role to play in small-scale operations. In the industrial field, small and cottage industries may be reserved for the private sector in the intermediate period.

By operating in small and cottage industries, private investors can make a substantial contribution to the economy ; and as the size of their operations will be limited their power of exploitation will also remain limited. The present private investment ceiling of Tk. 100 million is much too large ; and its further relaxation will be a step backward in the context of socialist development. The ceiling should not be high enough to allow the private investors to gain such power and privilege as may encourage them to seek to thwart socialist development.

But a conducive environment must be created for the private investors to play their assigned role. There should be a firm private industrial investment policy which should include the following, among other things : the ceiling allowed, industries in which private investors will be welcome, policy towards reinvestment of profits, incentives provided, and the length of the intermediate period (which may be, say, 10 years) after which the policy will come up for review. Stipulations should also be made about the options available to the investors after the expiry of the intermediate period. The government should also provide necessary facilities such as physical infrastructure, marketing facilities, credit and necessary industrial imports.

The imposition of ceiling on capital investment should induce investors to search for labour intensive techniques of production. It also offers the basic framework for manufacturing activities to be dispersed in a large number of small hands all over the country.

The policy towards foreign private investment must be consistent with the socio-political principles of the state. If domestic private capital is considered inimical to them, foreign private capital cannot be otherwise. The history of exploitation perpetrated by multi-nationals and transnationals in developing countries is well-known.

However, in view of the gap in resources, technology and skill, pragmatism may call for a role for foreign private investment in Bangladesh,

at least in the intermediate period.¹⁹ But adequate measures must be taken to keep its ill-effects to the minimum. A necessary pre-requisite for this is to allow foreign companies to operate only in partnership with the state, the state holding the controlling share i.e., at least 51 per cent. Indeed, even majority state holdings may not be a sufficient deterrent to the ill-effects of foreign private capitalism.

Available evidence suggests that, unlike in many other developing countries, foreign private investment in Bangladesh accounts for only about 2 per cent or so of the total fixed assets in the modern industrial sector, and that too is mostly in pharmaceuticals. The existing foreign private investment need not, therefore, be an important consideration in policy determination.

Small-scale and Cottage Industries

The contribution of small-scale and cottage industries to the GDP in Bangladesh, as noted earlier, is likely to be substantially underestimated by official statistics which put it at about 5 per cent in recent years compared to about 6 per cent for the large-scale industries. Hence, in reality the contribution of small-scale and cottage industries may not be less, perhaps even larger, than that of the large-scale industries. Moreover, the importance of small-scale and cottage industries is predominant in terms of employment ; available evidence suggests that they employ over 85 per cent of the total industrial labour force in the country. Also their share in the (domestic) production of the most important non-food consumption good, cloth, is over 80 per cent. These are significant contributions. And it has been recognised in both the First Five Year Plan (1973-78) and the Two Year Plan (1978-80) that small and cottage industries have an important role to play in the industrialisation process of the country. But in practice such industries have remained neglected as was the case in Pakistan days. Only about 2-3 per cent of the total public industrial investment allocation has gone to this sub-sector since Liberation. Also, no comprehensive development strategy

¹⁹If profit making prospects are right, then the possible nationalisation after a given number of years, say, 10 years net of the gestation period, should not discourage foreign investment provided a guarantee for appropriate compensation in the event of nationalisation forms part of the policy package.

has yet been worked out for these industries ; their problems and prospects have not been properly assessed.

There are, however, several arguments in favour of why small and cottage industries should play an important role in economic and social development of Bangladesh. Factor endowments of Bangladesh (scarcity of capital and foreign exchange and abundance of labour) favour labour intensive small-scale and cottage industries. With the population and labour force growing rapidly, the unemployment and under-employment situation in rural areas is deteriorating steadily. One estimate [11] shows that about 42 per cent of the agricultural labour force (defined as all those available for work in agriculture) were unemployed in 1975/76.

But agriculture has only a limited capacity to provide additional employment, notwithstanding increasing acreage under high yielding varieties of food grains which have higher labour requirements than local varieties. No conceivable rate of growth in large-scale industries, which currently employ only about 1.5 per cent of the total civilian labour force, can be of much avail in alleviating the unemployment and under-employment situation. Alternative employment opportunities and income generating activities, especially small-scale and cottage industries,²⁰ should therefore be promoted, especially in rural areas as the bulk of the unemployed live there.

The development of small and cottage industries can also form an effective part of a development strategy based on the utilization of the vast human resources of the country. The limited size of the domestic market for a wide variety of products which preclude the possibility of large-scale mass production, the high cost of transportation and communication, and the socio-economic need to avoid concentration of investment in few urban areas and to secure dispersal of industries all over the

²⁰These activities will not only provide employment and income earning opportunities, but will also add value through manufacturing, facilitate the development of entrepreneurs and skills and may also stimulate other employment and income generating activities through forward and backward linkages.

country, also underscore the importance of small and cottage industries in Bangladesh [15].²¹

But there are constraints in the development of small industries and in order to operate on these constraints and to carry out promotional, support and extension work effectively, an appropriate institutional network is needed. The Bangladesh Small & Cottage Industries Corporation (BSCIC) has the overall responsibility for promotion of small-scale and cottage industries in the country. Credit is administered usually through a consortium of commercial banks. However, it is only the small-scale industries which are the focus of BSCIC's promotional activities. Cottage industries have remained outside its operational reach. Also, there is no credit programme at all for cottage industries. It would appear that the existing institutional framework is grossly inadequate and ineffective in relation to the needs. But, detailed work is necessary to identify the weaknesses of the existing institutions and to evolve an effective institutional network for the task at hand.²²

IV. CONCLUDING REMARKS

Clearly the industrial policy of the country—be it in relation to the management of nationalised industries, or the role of the private

²¹Also, small-scale and cottage industries have a favourable effect on income distribution as opposed to large-scale industries which generate income inequalities.

²²It may be noted that the BSCIC is currently taking interest in generating data needed for policy and programme development purposes ; a desirable step. It is currently conducting a census of small industries in the country designed to obtain some information about the problems and the prospects of each of these industries in addition to a listing of the existing units with information on their size. The Bangladesh Institute of Development Studies (BIDS) has also recently undertaken for BSCIC a survey of rural (small and cottage) industries in 10 (out of 465) thanas of the country. After a census generating basic profiles of all the existing units in the selected thanas, the study will proceed to collect information on all aspects of the industries on the basis of appropriately selected samples on a twice weekly basis over a period of one year, and will hopefully provide a useful data base for policy and programme development purposes. This study will also look into the existing institutions with a view to identifying weaknesses and suggesting possible changes and improvements.

sector, or the development of small-scale and cottage industries—is suffering from inadequacies, uncertainties and contradictions. The current unsatisfactory performance and the shaky basis for future development of the sector are largely attributable to the failure of policy planning to provide an effective framework reflecting objectively the industrial environment in the country and the aspirations of the people. Effective policy planning cannot, however, take place unless socio-political perspective is clearly defined. Socio-political issues involved should, therefore, be urgently settled so that industrialization policy can be appropriately formulated. The genesis of Bangladesh demands the establishment of a society where the common man will enjoy his legitimate share of the fruits of development ; and this requires a systematic removal of the sources of unequal economic and political power. This must be reflected in the industrialization policy of the country.

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On the Normative Measurement of Inequality*

by

S. R. OSMANI**

Recent attempts at devising normative measures of inequality are critically examined in this paper. It is argued that some of the well-known measures are operationally irrelevant in comparing inequality between situations involving unequal total incomes. In addition, a new approach is suggested for comparison of inequality in the face of both unequal total incomes and different price structures. The framework of 'constant price comparison of named goods vectors' which has recently been employed for real national income comparison, is used for this purpose. The operational relevance of the new approach is also critically examined.

I. INTRODUCTION

The earliest attempts at measuring inequality did not start off from any explicit premise of social norms about distributive justice. Economic inequality was viewed as an objective phenomenon in the purely statistical sense of dispersion in the frequency distribution of income (or some other economic attribute) ; and its measurement was an exercise in positive quantitative economics. Measures like coefficient of variation, range, Gini-coefficient etc. are the outcome of this tradition. But since these so-called positive measures of inequality have tended to acquire normative significance in economic and political discussions, economists in recent times have tried to discern the value judgements implicit in them.

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At the same time new measures of inequality are also being developed which start from explicit specification of value judgements. These are known as normative measures of inequality. But although this new development has been widely acclaimed as a significant improvement over the traditional practice of drawing normative conclusions from purely positive measures, we shall argue here that it has brought with it new conceptual problems of its own which are not generally appreciated.

The first problem relates to the very *raison d'être* of a normative measure of inequality. These measures are derived from a pre-specified social welfare function. But if we do have such a function at our disposal, we may also conceivably use it to measure welfare directly. One may, therefore, ask : if we are able to measure welfare directly, why would we want to measure inequality as well ? We shall see in the process of answering this question that the existence of some of the popular measures cannot really be justified. Our conclusion, however, is not entirely destructive. As a positive outcome of our enquiry we shall be able to say when a normative measure of inequality can claim to be operationally relevant.

Secondly, theorisations on these measures are almost invariably conducted by defining social welfare on the space of money income, thereby disregarding the implication of price changes. But with given money incomes different price structures imply different levels of welfare for an individual and if social welfare is thought to depend on welfare of individuals, the welfare implication of an inequality index which ignores price differences must be of dubious value. We shall suggest in this paper a technique of inequality comparison which takes due note of price differences.

The paper is organised as follows : in Section II, we discuss two of the more popular approaches to the normative comparison of inequality, namely, Atkinson index and the principle of Lorenz domination. In Section III, we try to explore the operational relevance of these two measures of inequality. In Section IV, we develop a technique for normative comparison of inequality which takes into account the phenomenon of price variation. The operational relevance of our approach is examined in Section V,

II. TWO NORMATIVE MEASURES OF INEQUALITY

The Atkinson index of inequality presupposes the existence of a social welfare function. With the help of this function, one can measure actual welfare level from a given distribution of income as well as the potential welfare derivable from an optimal distribution of the same total income. The extent to which potential welfare deviates from actual welfare depends upon the deviation of actual distribution from the optimal one and thus provides a measure of inequality. Let actual and potential welfare be denoted by W and W^* respectively. An index of inequality can then be defined as

$$I = 1 - W/W^* \quad \dots \quad (1)$$

In fact this is how Dalton [3] had proposed to measure inequality long before Atkinson. But Atkinson [2] noted that since social welfare is based by assumption on cardinal utility functions which are invariant only upto a positive linear transformation, the value of social welfare and hence the index of inequality is not unique for any income distribution. In order to eliminate this indeterminacy, he adopted the strategy of measuring inequality in terms of two income levels which can be viewed as proxies for the values of actual and potential welfare.

In Figure 1, the point A represents a given income distribution in a two-person world with total income TT . W^1, W^2 etc. are the social welfare contours whose shape is determined by the assumed properties of the social welfare function. Atkinson assumed that social welfare is an additive function of individual utility functions which are strictly concave and identical for everyone. The implication of these assumptions is that welfare contours are convex to the origin and symmetrical around the 45° line. These properties of convexity and symmetry in turn ensure that the welfare contour representing maximum potential welfare derivable from TT is the one that meets TT tangentially on the 45° line, (e.g., W^3).

It is now quite clear that since a higher ranking welfare contour meets the 45° line farther from the origin than does a lower ranking one, the distances OQ and OR are positive monotone transforms of

potential and actual welfare, W^3 and W^2 , respectively, and as such can be accepted as valid proxies of the latter.

For an economic interpretation of these distances, note first of all that by simple geometry $OQ (=QT=TT'/2)$ is the average income denoted by \bar{e} . Distance $OR (=RT'=T'T'/2)^1$ is the level of income which if enjoyed by everyone will yield the same level of social welfare (W^2)

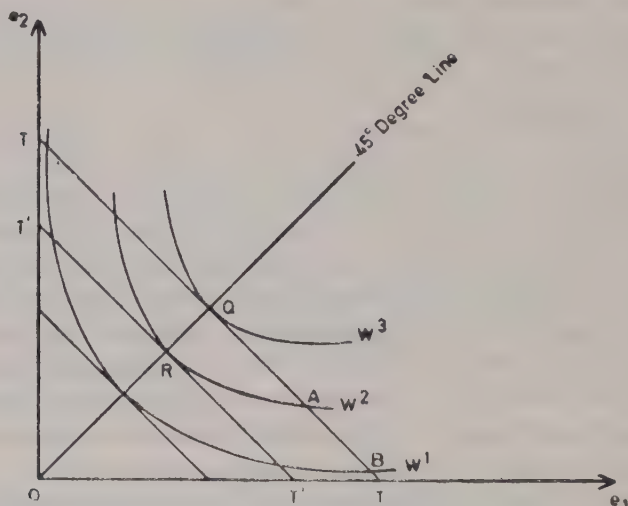


Figure 1

as emerges from the present income distribution. It is called the "equally distributed equivalent income" and is denoted by \tilde{e} . Replacing the welfare values in (1) by these income proxies, the inequality index is obtained as

$$I = 1 - \tilde{e} / \bar{e} \quad \dots \quad (2)$$

In order to apply this index into practice, some specific form of the underlying utility function must be assumed. Atkinson imposed a

¹Since the welfare contours are convex and symmetrical around the 45° line, the tangent $T'T'$ to W^2 curve at the point R , must make an angle of 45° with both axes so that $OR = RT' = T'T'/2$.

restriction on his inequality index which led to a unique specification of this function. He required this index to be mean-independent i.e., if everybody's income is changed in the same proportion the value of the index should not change. This restriction implies that the social welfare function must be homothetic. In conjunction with the assumptions of additivity and symmetry this additional restriction now uniquely determine the possible form of the individual utility function as²

$$U = a + (b/\beta) e_1^{1+\beta} ; \text{ for } \beta \neq 0 \quad \dots \quad (3)$$

$$U = \log e_1 ; \text{ for } \beta = 0$$

(concavity of U requires that $\beta \leq 1$)

Given a social welfare function of the form

$$W = \sum_{i=1}^n U(e_i), \text{ the index } I \text{ can be shown to be given by}$$

$$I = 1 - \left[\sum_{i=1}^n (e_i/\bar{e})^\beta \right]^{1/\beta} \quad \dots \quad (4)$$

The parameter $(1-\beta)$ is called the degree of inequality aversion ; with a higher value of $(1-\beta)$, more weight is attached to the transfers at the lower end of the income scale.

There is a different type of normative approach to the comparison of inequality which does not require the underlying utility function to be precisely defined. Only some broad restrictions are imposed and as such the resulting inequality comparison can claim to satisfy a much wider range of value judgements than could be accommodated by a measure like the one given by (4). This is known as the principle of Lorenz ranking and was first enunciated by Atkinson.

For a given total income he defined greater equality as higher social welfare. Armed with the utilitarian social welfare function he then went on to show that provided we know at least that the individual utility functions are strictly concave then a distribution will have higher welfare and hence higher equality, if its Lorenz curve lies

²The derivation of these results can be found in Atkinson [2] and Muellbauer [9]

strictly inside (i.e., uniformly closer to the equal division diagonal than) that of another distribution of the same total income.

This result was subsequently generalised in several directions.⁸ Atkinson proved his theorem with a welfare function defined on the utility space. By virtue of the assumed additivity of social welfare and concavity of individual utility, this function can be translated into a strictly concave welfare function defined on incomes.⁴ It has been shown that Atkinson's result can also be proved directly for such a function of incomes. The advantages of this direct formulation are that one need not assume an individualistic welfare function; and even if an individualistic function is assumed, one can dispense with the restrictive assumption of additivity. Moreover, the range of permissible value judgements can be widened even further by replacing strict concavity of welfare by the weaker condition of strict quasi-concavity⁵ (and by an even weaker condition called S-concavity) without upsetting the result. This generalised version of the theorem can now be stated as follows.

Let $W(.)$ be a strictly quasi-concave and symmetric social welfare function defined on the space of individual incomes e_i . Denote the binary relation of Lorenz dominance by L (i.e., the relation $A \succsim L B$ implies that the Lorenz curve of A lies strictly inside that of B). Then,

Theorem T. 1.

For two distribution vectors e^1 and e^2 of n given total income, $e^1 \succsim L e^2 \Rightarrow W(e^1) \geq W(e^2)$ and if not $e^1 \succsim L e^2$, then there is some $W(.)$ for which $W(e^1) < W(e^2)$.

⁸These generalisations are due to Dasgupta, Sen and Starrett [4], Rothschild and Stiglitz [11] and Sen [14].

⁴Concavity of welfare function implies a mild form of egalitarian value judgement. A welfare function is said to be strictly (weakly) concave if a weighted average of two distributions A and B yields a welfare level which is higher (no less) than the weighted average of welfare given by A and B , when the same weights are used in both cases. Concavity thus implies a bias for the social averaging process.

⁵Quasi-concavity, like concavity, also implies an egalitarian bias, but in a milder form. A welfare function is called strictly (weakly) quasi-concave if welfare from a weighted average of two income distributions is higher (no less) than the minimum of the two welfare levels given by the two distributions separately. Quasi-concavity is a weaker condition than concavity in the sense that a concave function is necessarily quasi-concave, but the converse is not always true.

We shall not offer any formal proof of this theorem here.⁶ But its logic may be appreciated by noting a result due to Hardy, Littlewood and Polya [6]. It shows that if $e^1 \succcurlyeq e^2$, then the distribution e^1 can be obtained from e^2 by a sequence of positive transfers from the richer to the poorer in e^2 . Since strictly quasi-concave welfare function implies a social preference for the averaging process, a distribution that emerges from such transfer towards the poorer must have a higher welfare ranking; hence the superiority of a distribution which Lorenz-dominates another. The second part of the theorem shows that if the relation of Lorenz domination does not hold i.e., if the Lorenz curves intersect each other, then with some specific form of the function $W(\cdot)$ either distribution can be shown to be non-superior to the other. In other words, armed only with the knowledge that the welfare function is strictly quasi-concave, it is not possible to rank the distributions if the Lorenz curves happen to intersect each other. The principle of Lorenz domination can therefore yield only an incomplete ranking and comparison of inequality in this framework thus appears as an exercise in quasi-ordering.

III. OPERATIONAL RELEVANCE OF NORMATIVE MEASURES OF INEQUALITY

We shall now address ourselves to the issue of the operational relevance of the normative measures of inequality. In other words, we shall ask, why do we want to have an index of inequality with a normative significance?

Surely the answer is that we want our index to define a preference ranking; to be specific, if the index goes down we would like to say that it has been a change for the better. But this answer begs the questions of precisely what is it that inequality index is supposed to rank and why are we interested in the preference relation revealed by this ranking? The first question relates to the interpreta-

⁶A formal proof can be found in [4]. Several alternative intuitive explanations are given in [14].

tion of inequality ranking in the normative approach and the other refers to the relevance of this approach.

The immediate answer to the first question is of course that inequality ranking reveals a preference about distribution. But distribution is defined here not as a frequency distribution or configuration of incomes, but as the interpersonal relativities within an income configuration. To see this difference more clearly, imagine that everybody's income in a given frequency distribution is doubled. We now have a different income configuration, but interpersonal relativities have not changed. In Atkinson's terminology, a 'shift' has taken place in the income distribution, but the 'shape' has remained unchanged. It is these shapes of alternative income configurations that the normative measures of inequality intend to rank in terms of preference.

But what precisely is meant by saying that the shape of configuration A is preferable to the shape of B? For a given total income the answer is quite simple. Better shape or lower inequality in this case implies higher social welfare for A than for B. This is immediately obvious in the case of Lorenz ranking where for a given total income greater equality is defined as higher welfare. But this is also true for the Atkinson index which can be confirmed by comparing the points A and B in Figure 1.

But when total incomes are different, greater equality does not necessarily imply higher actual welfare. Once again this is obvious in the case of Lorenz ranking where A cannot be said to have higher welfare than B, when the total incomes are different, even if the Lorenz curve of A is strictly inside that of B (see Theorem T.1). The same is also true for the Atkinson index. Referring back to Figure 1, the inequality index is bigger for C than for B, but they both lie on the same welfare contour.

What then is the welfare interpretation of inequality comparison in the real world where total income cannot be typically assumed to be constant? Existing literature is conspicuously silent on this question. All the theoretical discussions take place under the assumption of a given total income. But when the theory is applied into practice to compare inequality of situations involving unequal total incomes, it is not made

clear what welfare interpretation can still be given to this exercise. We shall suggest here that a plausible interpretation can in fact be offered in terms of a specific interpretation of the concept of 'shape'. This may be done by defining what we shall call a "normalised distribution." Normalised distributions of two actual distributions (in the sense of configuration) are derived by expressing them as two interpersonal distributions of a given total income. Suppose that total incomes of situations A and B are T^a and T^b respectively. Assume also that we wish to normalise on the total income T^* which can be equal to T^a or T^b or any other income. Now multiply everybody's income in A by a factor T^*/T^a and that in B by T^*/T^b . The two income configurations we shall create in the process are the normalised distributions A^* and B^* respectively. Both have the same total income T^* , but A^* has the same relative interpersonal distribution as A and B^* has the same as B. What this normalisation thus achieves is that the element of 'shift' is eliminated from two actual distributions and their difference in 'shape' is brought into clear relief. Therefore, comparison of inequality which we previously defined as comparison of 'shape', can be defined more precisely as comparison of normalised distributions. Accordingly, lower inequality or better 'shape' of A would imply that the normalised distribution A^* has a higher welfare value than B^* in terms of the welfare function which was used to calculate the inequality index. We shall see that inequality ranking derived from both Lorenz domination and the Atkinson's index in situations involving unequal total incomes can indeed be interpreted in this manner.⁷

The Lorenz curve of a normalised distribution is identical to that of the actual distribution on whatever total income we choose to

⁷There is, however, an element of indeterminacy involved in this interpretation since in principle one may normalise on any total income. So the question must arise whether ranking of normalised distributions is invariant to the choice of the particular level of normalisation. Such invariance would indeed be ensured if the index of inequality is mean-independent. There has been a good deal of controversy over the desirability of a concept of inequality which is independent of mean income. We shall not go into that debate here (see [14] for a discussion of these issues). Suffice it to say that both the Atkinson index and the Lorenz curve are independent of mean and hence the choice of total income for the purpose of normalisation does not matter in this case.

normalise.⁸ Therefore, if we know that the Lorenz curve of A lies strictly inside that of B we also know that the same relation holds between the Lorenz curves of A* and B*. Since A* and B* have the same total income, whatever that income is, theorem T.1 can now be invoked to conclude that A* has higher welfare than B* in terms of any strictly quasi-concave and symmetric welfare function.

To interpret the Atkinson index in a similar manner, consider two income configurations A and B of unequal total incomes. Let us say that according to the Atkinson index I, A turns out to be less unequal than B. But by the assumption of mean-independence, the value of the index must be the same for all income configurations having the same 'shape' or relative interpersonal distribution. Accordingly, a normalised distribution of A, on whatever level of income one may choose to normalise, must have the same value of the index I as A itself; and hence if A is less unequal than B, then by the same token A* is less unequal than B*. But since A* and B* have same total income, less inequality of A* must mean that the welfare value of A* is higher than that of B*.

We have thus seen that comparison of inequality has the natural interpretation of comparison between normalised distributions—'less inequality' or better 'shape' can be defined as higher welfare of normalised distribution. This leads us to the next and what we regard as the most crucial question: why should we be interested in the relative welfare levels of normalised distributions? The operational relevance of the normative approach to inequality comparison must hinge crucially on the answer to this question.

Clearly the welfare ranking of normalised distributions cannot by itself be of any interest. The objective of the normative approach to the measurement of inequality is to shed light on social welfare. Welfare ranking of normalised distributions may help in this evaluation of social welfare of alternative income configurations, because it provides a judgement on 'shape', and when used in conjunction with

⁸Lorenz curves are defined in terms of percentages; and percentages must remain the same when all incomes are changed in the same proportion and in the same direction in the course of normalisation.

other information relating to 'shift' (e.g., mean income) it may help to form an overall judgement.

This indeed seems to have been the motivation behind the traditional use of the positive measures in making normative judgement. Until very recently, the feasibility of using a social welfare function to compare actual welfare of the real world situations was not fully recognised. Even if the possibility was recognised, many people would still refrain from using it in view of the degree of precision that is demanded of one's value judgement for formulating such a function. As a pragmatic approach towards making overall judgement it was then natural to look for a number of separate evidence and the information on inequality was just one of the requisite ingredients. Seen in this light the operational relevance of the so-called positive measures in normative analysis becomes quite clear.

But the same cannot be said for the so-called normative measures. They start from an explicit specification of social welfare function. Moreover, the welfare function underlying Atkinson index is spelt out in sufficient details to enable one to compare social welfare directly for any conceivable pair of income configurations. But if we can thus achieve the objective of reaching an overall judgement directly, why should we go for the indirect piecemeal approach involved in the comparison of inequality ?

More importantly, it is not only that inequality comparison is unnecessary in this case, it is also a relatively inefficient method of reaching the final overall judgement. As mentioned before, inequality is only one piece of information required to compare social welfare in the pragmatic approach. It must be combined with other relevant pieces of information relating to 'shift'. But the ensuing synthesis can only be rough and pragmatic rather than precise and systematic. On the other hand, given the social welfare function on the basis of which inequality is measured, direct comparison of welfare will be precise and systematic. Therefore, the use of Atkinson type measures implies opting for the second best solution when the first best exists—a practice that surely defies logic,

It may be noted that while talking about the relevance of normative measures we have so far referred to the Atkinson type measures only. The alternative approach via Lorenz ranking was kept out of discussion. This was done on purpose. Although the latter, like the former, starts from a social welfare function, there is an essential difference between the two. The difference that has been most discussed in the literature is the fact that while the former yields a complete inequality ordering, the latter gives only an incomplete ranking. But there is yet another important difference between the two which is what really interests us here.

The social welfare function underlying Atkinson type measures is such that not only inequality but also social welfare can be compared for any two income configurations. But the function underlying Lorenz principle is such that welfare can be compared, given the relation of Lorenz domination, only when total incomes are equal (see Theorem T.1). But normalised distributions can be always compared, provided of course that the relation of Lorenz domination holds. The implication is that when our value judgements are not precise enough to specify anything more than that social welfare is symmetric and strictly quasi-concave, comparison of inequality is an operationally relevant exercise. No doubt this is an exercise in the second best as all comparisons of inequality are. But it is relevant because the first best solution does not exist in a typical context where total incomes are different.

To conclude, comparison of inequality is an operationally relevant exercise only when it is not possible to compare social welfare directly. By this criterion, the Atkinson type measures are irrelevant and their use in practice entails the irrationality of indulging in an exercise of the second best when the first best solution exists. On the other hand, Lorenz ranking is relevant because the first best solution in this case is not normally available.

IV. PRICE VARIATION AND MEASUREMENT OF INEQUALITY

The foregoing discussion has taken place in complete abstraction from the complexities caused by price variation. This is of course in

the true tradition of the literature on income inequality. Although social welfare is generally assumed to depend on individual welfare which can be proxied by individual money incomes only for given prices,⁹ they have defined welfare on the space of money income turning a blind eye to the effects of price variation. Indeed, the theory of inequality has never found it easy to accomodate the price effect. The problem is an old one and is closely related to the problems in the theory of index number.

The problem can be tackled ideally by converting individual money incomes into individual 'real' incomes. Let e^a and e^b be the money income vectors in situations A and B whose corresponding price vectors are p^a and p^b respectively. Let $e_i^{b''}$ be the income which at prices p^a yield the same individual welfare for person i as does income $e_i^{b'}$ at prices p^b . $e_i^{b''}$ is then called the real income of person i in situation B relative to the prices of A. One can then compare inequality between A and B by comparing the vectors e^a and $e^{b''}$.¹⁰

But the trouble with this approach is that it is extremely difficult to estimate the price index which would convert e_i^b into $e_i^{b''}$. Such an index is called the 'true' price index and an exact derivation of this index is possible only when the individual utility functions are known.¹¹ But since exact form of utility functions are generally unknown, we can only try to approximate the 'true' index in practice. Sometimes the Paasche price index is used as an approximation since it can be shown that this index gives a lower bound for the 'true' index. But unfortunately, the upper bound is not in general known and it is, therefore, impossible to judge how good or how bad this particular approximation is.¹²

⁹Assuming of course that individual welfare functions remain unchanged.

¹⁰An element of ambiguity must be noted here. Instead of comparing e^a and $e^{b''}$, one can also compare $e^{a''}$ and e^b , where $e_i^{a''}$ is the real income of person i in situation A relative to the prices of B; but the two comparisons need not yield the same inequality ranking.

¹¹The concept of 'true' price index was first developed by Knous [7]. For a modern discussion, see [1].

¹²However, in the special case of a homothetic utility function, Laspeyre's index provides an upper bound; and Samuelson and Swamy [12] have shown that in this case any symmetric mean of Paasche and Laspeyre's indices will approximate the 'true' index upto the third order in accuracy.

One is thus left with either of two unsatisfactory ways of dealing with price variation—one may either assume an arbitrary form of the individual utility function,¹³ or one may use an approximation of true price index of uncertain quality.

In what follows, we shall suggest a method of accounting for price differences in inequality comparison which bypasses the need for identifying the 'true' price index. Constant price incomes given by the Paasche price index are all we need in this approach. Of course, we have to pay a price in the process. Our technique of inequality comparison is in principle capable of generating only a partial ordering in the sense that there may be cases where we shall not be able to say whether one distribution is more or less unequal than another. But this is simply the consequence of formally recognising our ignorance about the exact form of individual utility functions and the 'true' price index, coupled with our refusal to make any arbitrary assumptions about them. Our technique is designed to help us make conceptually valid comparisons, wherever possible, given this ignorance and our refusal to hide it.

The analytical framework of this technique has already been developed by Sen [16] in the context of real national income comparison. Social welfare in this approach is defined not on the space of individual incomes, but on that of what has been called the 'named goods.' A 'named good' is defined with reference to both commodity and the person consuming that commodity, so that when the same commodity is consumed by two different persons, we really have two different named goods. Let there be n individuals and m commodities, so that there is an mn -vector of named goods x whose typical element x_{ij} shows the amount of j th commodity consumed by the i th individual. Comparison of social welfare between two social states A and B then amounts to a comparison of their respective named goods vectors x^a and x^b . For the sake of greater generality, it is assumed that only a preference ordering exists over alternative named goods vectors, but a real-valued social welfare function does not necessarily exist.¹⁴ Let R denote the weak

¹³For an attempt along this line, see [8].

¹⁴The generality consists in the fact that in the case of lexicographic ordering, no real-valued welfare function exists; but welfare can still be compared with the help of the given ordering.

binary relation of preference so that $x^a R x^b$ implies that x^a is 'at least as good as' x^b (P stands for strict preference and I for indifference). The problem was then posed as : under what conditions one can deduce the relationship $x^a R x^b$ (or $x^a P x^b$ or $x^a I x^b$) from actual data.

In order to solve this problem, some reasonable conditions are imposed on the nature of the preference relation R in the form of the following axioms.¹⁵

Axiom C : R is a complete ordering.

Let X denote the set of all possible named goods vectors. This axiom then implies that for any $x^1, x^2 \in X$, either $x^1 R x^2$ or $x^2 R x^1$.

Axiom V : Let $R(x)$ denote the set of all those named goods vectors which are at least as good as x . Then $R(x)$ is a convex set.

Axiom M : Let \geq denote the relation of vector dominance i.e, $x^1 \geq x^2$ implies that no element of x^1 is smaller than the corresponding element of x^2 and at least one element is strictly bigger. Then,

$$x^1 \geq x^2 \longrightarrow x^1 P x^2$$

On the basis of these axioms, Sen then proves the following "fundamental theorem of constant price real income comparison".

Theorem T. 2. If preference relation R satisfies the axioms C, V and M, there exists a vector s such that for any two equi-dimensional vectors x^a, x^b

$$s \cdot x^a > s \cdot x^b \longrightarrow x^a P x^b \quad \dots \quad (5)$$

An intuitive explanation of this theorem can be given with the help of Figure 2.¹⁶

Let W^a be the social welfare contour passing through the point x^a , and let us define a vector s such that the ratio of its elements

¹⁵For a more elaborate discussion of these axioms, see [10 ; 16].

¹⁶A rigorous proof can be found in [16].

gives the slope of the tangent at x^a . Then it is clear that if $s \cdot x^a > s \cdot x^b$, x^b must be below the line $T^a T^a$. But because of the convexity of $R(x^a)$, this will mean that x^b is on a lower social welfare contour than x^a . This is the meaning of Theorem T.2.

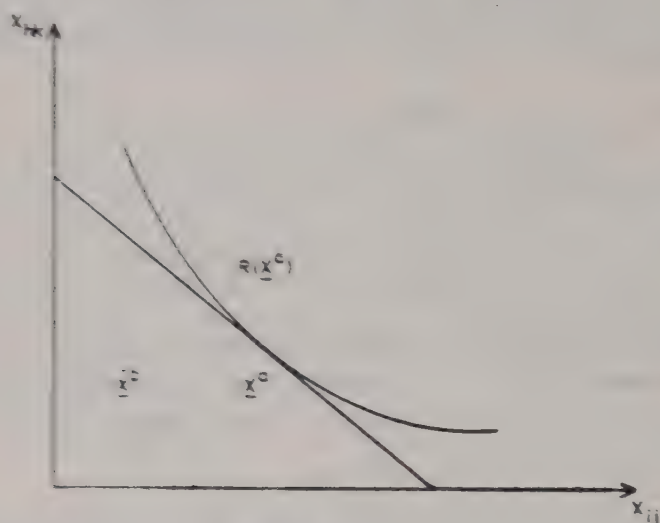


Figure 2

It is also clear that since s gives the slope of the tangent at x^a , it gives us the social marginal rates of substitution, or in other words the shadow prices of the named goods, at the point x^a . The above theorem thus shows that comparison of real national income measured at the shadow prices s , reveals social preference ordering.

It is now easy to see how this analytical framework can be utilised to compare inequality as well. We have already shown that normative comparison of inequality amounts to social welfare comparison of normalised distributions. Let us denote the normalised named goods vectors corresponding to the actual vectors x^a and x^b of situations A and B as x^{a*} and x^{b*} respectively.¹⁷ Let also the binary relation of

¹⁷We shall define these normalised vectors more precisely below.

inequality ranking be denoted as P^e (i.e., $x P^e y$ implies that x has less inequality than y). The social preference relation is given by P .

We thus have,

$$x^a P^e x^b \leftrightarrow x^{a*} P x^{b*} \quad \dots \quad (6)$$

But it follows from Theorem T. 2. that given axioms C, V and M, there exists a shadow price vector s such that

$$s \cdot x^{a*} > s \cdot x^{b*} \rightarrow x^{a*} P x^{b*} \quad \dots \quad (7)$$

Combining (6) and (7) we thus have the following theorem of constant price inequality comparison.

Theorem T. 3

If the social welfare relation R satisfies the axioms C, V and M, then for any two equidimensional named good vectors x^a and x^b , there exists a price vector s , such that

$$s \cdot x^{a*} > s \cdot x^{b*} \rightarrow x^a P^e x^b \quad \dots \quad (8)$$

This theorem states that real income comparison of normalised distributions is equivalent to comparing inequality between two actual distributions.

We, therefore, need two things in order to compare inequality—identification of the shadow prices s and precise definition of the normalised distributions x^{a*} and x^{b*} .

We have seen that the vector s can be interpreted as giving the social marginal rates of substitution between various named goods. Thus s_{ij} corresponding to any x_{ij} is the marginal contribution to social welfare of the named good x_{ij} . If it is now assumed that social welfare depends on individual welfare, then s_{ij} will consist of two parts—the welfare that x_{ij} yields to person i and the weight that this person's welfare receives while arriving at social welfare. Assuming in addition that market prices accurately reflect marginal contribution of commodities to individual welfare, a simple definition of shadow price will then be,

$$s_{ij} = \psi w_i p_j \quad \dots \quad (9)$$

where p_j is the market price of commodity j , w_i is the weight on i th person's welfare and ψ is a normalising constant. w_i 's are called the distributional weights since these weights will depend on the existing distribution of income and welfare. Exactly what the nature of this dependence will be is of course a matter of value judgement. The most widely held value judgement in this regard states that the marginal welfare of a better off person should receive a lower weight. The following axiom called the axiom of "rank order weighting" is one possible way of specifying this inverse relationship between distributional weights and the existing levels of income and welfare.

Axiom O :

Let the incomes of all persons be arranged in the ascending order of magnitude and let each person's income be subscripted by the rank of that income, so that there are exactly $n-i+1$ persons with an income greater than or equal to e_i . The distributional weight w_i is then given by

$$w_i = n-i+1 \quad \dots \quad (10)$$

Given the system of rank-order weighting, shadow prices for named goods are then given by

$$s_{ij} = \psi (n-i+1) p_j \quad \dots \quad (11)$$

One final problem now remains in the specification of shadow prices. Recall that in Theorem T.3, the same shadow price vector s is used to evaluate both x^a and x^b . Let us assume that the shadow prices relevant for A are being used for this purpose. But that alone does not tell us which named good's price in A should be used to evaluate a named good x_{ij}^b in B. If commodities rather than named goods were involved, then of course p_j^a would be used to evaluate the j th commodity in B. But since we are dealing with named goods, we must also specify a correspondence between the 'names' i.e., we need an interpersonal correspondence between the populations of A and B. Only then would it be possible to say which named good's price in

A should be used for which named good in B. For instance, if the correspondence is drawn between the k th person in A and i th person in B, then the shadow price to be used for x_{ij}^b would be s_{ki}^a .

But it is quite obvious that unless communities A and B are inhabited by the identical set of people, there is no uniquely natural way of setting up correspondence between the two populations. Both size and composition of population may differ. We shall ignore the problem of size here¹⁸ and deal with different communities of the same size. Clearly, if the population size is n , there are $n!$ ways of establishing correspondence. For our purposes we shall choose a particular correspondence called the 'principle of ordinal correspondence' which is established by arranging the individuals of two populations in the ascending (or descending) order of their money incomes and then relating a person of a given rank in B with the person of the same rank in A. In other words, the richest person in A is related to the richest person in B and so on.

After having specified the shadow prices fully in the above manner, an interesting theorem on real national income comparison can now be proved on the basis of Theorem T. 2.

Theorem T. 4

Given axioms C, V, M and O characterising the social welfare relation R and given the principle of ordinal correspondence, for any two equi-dimensional named goods vectors x^a and x^b ,

$$\bar{e}^a (1 - G^a) > \bar{e}^{b'} (1 - G^{b'}) \rightarrow x^a P x^b$$

Where \bar{e}^a and $\bar{e}^{b'}$ are the mean incomes and G^a and $G^{b'}$ are the Gini-coefficients of A and B respectively, everything being measured at prices p^a of A.¹⁹

¹⁸For a mechanism of dealing with the problem of variable size within the present framework, see [10 ; 16].

¹⁹For proof, see [10 ; 16].

It is now clear that given a precise definition of normalised distributions x^{a*} and x^{b*} , the principle of inequality comparison embodied in Theorem T. 3 can be given a specific content through a theorem similar to T. 4.

Recall that the purpose of normalization is to eliminate the element of 'shift' by expressing two income configurations as alternative distributions of the same aggregate. This aggregate was described as a given total income in our previous discussion. But in view of the fact that we are now dealing in the space of named goods rather than money incomes, we can no longer normalise on a given total income. Instead we shall normalise on a given bundle of commodities c . Moreover, we shall choose a particular normalisation, namely, the vector c of the community at whose shadow prices s , the comparison will be made. Thus if we choose to use the shadow price vector of A, while comparing situations A and B, the normalised distribution of A will be A itself; and the normalised distribution of B, denoted as B^* , will be defined as the one in which per capita amount of each commodity is the same as in A, but the relative interpersonal distribution of each commodity is identical to that of B.²⁰

Formally we can thus define the normalised distributions x^{a*} and x^{b*} as

- (a) $x^{a*} = x^a$
 - (b) x^{b*} is defined by the following two conditions
 - (i) For all j : $\sum_i x_{ij}^{b*}/n = c_j^{b*}/n = c_j^a/n$
 - (ii) For all i, j : $x_{ij}^{b*}/c_j^{b*} = x_{ij}^b/c_j^b$
- } ... (12)

We can now suggest the following specific criterion of inequality comparison.

²⁰Per capita rather than total amount of each commodity is assumed to be the same in the normalised distributions of A and B, because in the general case of unequal population size, the element of 'shift' cannot be eliminated by equality in the aggregate. In our earlier discussion, normalisation was made on total income, because the traditional theories of inequality implicitly assume a given population,

Theorem T. 5

If the social welfare relation R satisfies the axioms C,V,M and O, and given the principle of ordinal correspondence, then for any two equi-dimensional vectors x^a and x^b ,

$$G^a < G^{b*'} \rightarrow x^a P^e x^b$$

Where G^a and $G^{b*'}$ are the Gini-coefficients given by x^a and x^{b*} respectively at prices p^a ; and x^{b*} and P^e are defined by (12) and (6) respectively.

Proof : We know from Theorem T. 4 that

$$\bar{e}^a (1-G^a) > \bar{e}^{b*'} (1-G^{b*'}) \rightarrow x^a P x^{b*}$$

Where \bar{e}^a and $\bar{e}^{b*'}$ are the mean incomes given by x^a and x^{b*} respectively at prices p^a . In view of definition (6), we thus have,

$$\bar{e}^a (1-G^a) > \bar{e}^{b*'} (1-G^{b*'}) \rightarrow x^a P^e x^b \quad \dots \quad (13)$$

But since per capita availability of each commodity is the same in A and B^* (see (12)), at any set of constant prices the values of their mean incomes must be the same too, i.e.,

$$\bar{e}^a = \bar{e}^{b*'} \quad \dots \quad (14)$$

Combining (13) and (14) we thus have

$$G^a < G^{b*'} \rightarrow x^a P^e x^b \quad \text{Q.E.D.}$$

It is now easy to see how the problem of true price index is neatly avoided in our method of inequality comparison. The constant price Gini-coefficient $G^{b*'}$ is derived from constant price money incomes $e_1^{b*'}$ defined as

$$e_1^{b*'} = p^a \cdot i(x^{b*}) \quad (15)$$

where $i(x^{b*})$ is the personal consumption basket of person i in the normalised named good vector x^{b*} . All we need in order to obtain $e_1^{b*'}$ is thus the Paasche price index and since this constant price income

is not given the interpretation of real personal income, the problem of true price index simply does not arise.²¹

Our technique of inequality comparison as given by Theorem T.5 may appear to be simply an elaborate means of rehabilitating the good old Gini-coefficient as a measure of inequality. In a sense, this is true. But where our method differs from its traditional use is in its interpretation. In the first place, we compare the Gini-coefficients of normalised distributions rather than the actual distributions as in the usual practice. Secondly, when Gini-coefficient was given a normative interpretation in the past it was assumed that the underlying welfare function is a weighted sum of incomes, weights being the rank-order weights [15]. But in the present case, although we are using the same rank-order weights, the welfare function is not being specified as a weighted sum. In fact, welfare function (or, rather welfare relation R) is being defined here not in the space of income at all, but in that of named goods, and the 'at least as good' set is assumed to be convex (axiom C above) for which a weighted sum form of welfare function is a sufficient, but not necessary condition. Thirdly, whereas traditionally Gini-coefficient is used to generate a complete ordering, in the present case we only get an incomplete ranking. For instance, we can say that inequality is less in x^a than in x^b only if $G^a \leq G^{b*}$ at the constant prices p^a . If G^a turns out to be greater than G^{b*} , we cannot necessarily say that x^a embodies more inequality.

V. OPERATIONAL RELEVANCE OF THE NEW APPROACH

We have seen how inequality can be compared in the face of price variation by using the framework of real income comparison proposed by Sen.

²¹One apparent problem, however, is that in order to calculate the Paasche index, we shall have to know both the quantities and prices of commodities in B^* . But while the quantities can be found from the quantities in A and B by following the definition (12), there is in general no simple way of knowing what the relevant market prices are in a hypothetical community B^* . But this problem is more apparent than real. It can be shown that by virtue of the condition (12), that e_1^{b*} can be easily estimated from the actual data relating to A and B , without making any direct use of the prices and quantities of B^* . See [10, p. 102].

But a fundamental question still remains. It relates to the operational relevance of our approach to measuring inequality, an issue we have given so much prominence to in Section III. We have seen how the technique of real income comparison developed by Sen enables us to compare actual welfare of any two income configurations by using the same methodology and the same axioms used by us to compare inequality (see T. 4 and T.5). It may, therefore, seem that by comparing inequality through our procedure, one would indulge in the second best exercise when the first best solution of directly comparing actual welfare is also available. Is not then our approach subject to the same allegation of irrationality and irrelevance as we levelled against the Atkinson-type measures ?

We shall argue that this is not really so. If we intend to compare inequality with a view to using it in conjunction with other relevant pieces of information relating to "shift" to arrive at an 'overall' judgement about welfare, it would indeed be irrelevant and also inefficient relative to the direct comparison through real national income. But that is not the objective we have in mind while suggesting the present approach to the measurement of inequality. Rather, we intend to use it as a supplement of real income comparison. We shall argue that the particular axioms used by Sen to compare real income may make the resulting comparison of actual welfare less than satisfactory in certain cases. In those cases, the combined use of real income and inequality comparison may help to arrive at a more satisfactory judgement on social welfare. Let us elaborate the point.

It may be recalled that both real income comparison *a la* Sen and our own methodology of comparing inequality uses the system of rank-order weighting (axiom O) as the relevant distributional value judgement. The appeal of this axiom consists in the fact that it embodies an egalitarian bias in so far as a person enjoying higher income and welfare receives a lower distributional weight.

But the egalitarian content of this weighting system is not beyond doubt. The ethical appeal of distributional value judgements are traditionally considered within the framework of redistributing a given total income. In that context, of course, rank-order weighting appears to

be sufficiently egalitarian. Any pure transfer from the poor to the rich will be judged by it to be a change for the worse.

But the picture changes dramatically when one leaves the arena of pure transfer. Consider any income configuration given by the n -vector e in which incomes are ranked in the descending order of magnitude.²² Now imagine that we increase the income e_1 of the richest person and reduce that of the poorest person, e_n , leaving all other incomes intact. Since, according to the rank-order system the weights on e_1 and e_n are 1 and n respectively, total real income will fall as long as e_1 rises by less than n times the fall in e_n . But if e_1 rises by more than that, real income will be higher.

Of course, one can argue that higher welfare in the latter case is simply due to the fact that the rise in the absolute welfare of the richest person more than offsets the impact of greater disparity. Given the value judgements, this is indeed the case. But it is quite possible for an egalitarian observer to hold the view that when the gap between the rich and the poor is already too wide, any further stretching of the gap is socially undesirable.²³ Other things remaining the same, it would indeed be difficult, in a society worried at the appalling disparities in living standards, to justify a policy that lowers the income of the poorest by ϵ and raises that of the richest by more than $n\epsilon$.

But unfortunately, such quite plausible value judgements cannot be represented by the axiom of rank-order weighting. In fact, any system of weighting which relates to the ranks of incomes only, must fail to serve this purpose.

But as soon as we normalise these two distributions on a given total income, the above illustration will appear as a case of pure transfer from everybody other than the richest to the richest person, keeping ranks the same as before. Therefore, given the principle of rank-order weighting, comparison of inequality, based as it is on normalised distributions, will fail to judge the new distribution favourably.

²²In order to simplify the argument, we are now abstracting from price variation and hence talking in terms of income rather than named goods.

²³The 'Equity Axiom' proposed by Hammond [5] embodies such a value judgement.

This illustration shows in a very simplified way how comparison of inequality can supplement real income comparison of social welfare. Real income comparison based on the principle of rank-order weighting is to be regarded not as a conclusive judgement on social welfare, but as a provisional one. Borrowing a terminology used by Sen [13], we may call it a non-compulsive judgement on social welfare. If comparison of inequality ranks two social states in the same way as does the comparison of real income, we shall be able to have more confidence in such a judgement. That is precisely the operational relevance of our approach to the comparison of inequality.

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The Functional Form of the Demand for Money in Bangladesh^{*}

by

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A generalised money demand function (GMDF), based on Box-Cox parametric transformations, has been estimated for Bangladesh. This generalised form reduces to the linear, semi-log and log-linear forms, under certain restrictions. By incorporating different transformations, and by considering equilibrium and disequilibrium versions, the estimates of the generalised money demand function have been compared with those obtained from the restrictive models. A log-likelihood test has been carried out for choosing an appropriate functional form. Our results indicate that the linear form is appropriate for the equilibrium version of the money demand function, while in the disequilibrium version, none of the restricted models seems to be appropriate. The behavioural properties of the alternative models have been examined by considering the movement of income and interest rate elasticities in the sample period. The empirical performance of alternative models in terms of their predictive ability has also been examined. Theil's U-statistic constructed for this purpose revealed the superiority of estimating the generalised money demand function.

I. INTRODUCTION

The quantity theory of money has largely been centred around the appropriate determinants of demand for money, and provides no guidance as to the appropriate functional specification. It has become then, a common practice to specify a linear (LI) or a Log-linear (LL)

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functional form for estimating the demand functions. The choice of these forms is generally guided by their convenience in the statistical estimation, and is hence arbitrary in nature. Such arbitrariness in specifying the functional form of the money demand equation may introduce specification error,¹ which in turn may yield biased and inconsistent parameter estimates.

In order to avoid the element of arbitrariness in selecting functional form, Box-Cox [1] has suggested a parametric transformation in which the LI and LL formulations are special cases. This transformation allows the estimation procedure to select the functional form which maximises the likelihood function in the sample, and can thus be cited as a General Functional Form (GFF). In view of its generalised nature, Zarembka [22] has expounded its importance in estimating money demand function where the demand for money is related to current income and current interest rate. White [21] and Spitzer [18] have explored further the importance of the GFF formulation,² by incorporating a liquidity trap in the money demand function ; the latter work, in addition, also introduced several Box-Cox transformations in the same function.

The GFF in addition to its generalised nature, also provides variable elasticities of demand with respect to interest rate and income. The interest rate elasticities, in particular, play an important role in testing the money market conditions, specially when the expansion of non-bank financial intermediaries is substantial. It is often argued that the expansion of non-bank financial intermediaries can frustrate the monetary policy, and that other assets in the portfolio may tend to be a perfect substitute for money. Such a phenomenon on the other hand implies that interest rate elasticity in the money demand function is infinite.³ The GFF can be used to test such hypothesis, as it provides variable interest rate elasticities across the sample observations.

¹See Kmenta [6].

²See for the application of GFF in other studies : Murty and Suryanarayana [13], Murty and Nambiar [15], Murty and Shah [14], Cheng [3], Hui-Shyong and Cheng [5], Zarembka [23], Khan and Ross [7].

³See Cagan and Schwartz [2] and Mills and Wood [9], who have used this criterion for testing the money market conditions.

The present paper seeks first, to estimate the money demand function for a less developed country—viz. Bangladesh—in the GFF framework, and then to test the appropriateness of the LI and the LL formulations which are being commonly used.⁴ We adopt the traditional formulation of the money demand function, where the real money balance is related to the rate of interest and real income. We also postulate in the subsequent analysis, a partial adjustment mechanism by relaxing the assumption of instantaneous adjustment between the real money balance and the desired flow, by considering different parametric transformations.

In the next section we introduce the GFF and outline its estimation procedure, and the test criterion used to decide on the appropriate functional form. Section 3 will compare the results obtained from estimating the GFF for the money demand function, with those obtained from the restricted models (Linear, Log-linear, Semi-log). This section will also discuss the behavioural aspects of the alternative models, and compare their empirical performance. Section 4 will outline the conclusions of the study.

II. GENERAL FUNCTIONAL FORM

The Box-Cox procedure involves the specification of a general power function that contains all the functional forms viz. Linear, Log-linear, Semi-log etc. as special cases.⁵ In other words, all linear in parameter transformation functions are particular cases of the GFF.

Writing $y(t)$ as the observations on the dependent variable, $X_i(t)$ as the observations on the i th independent variable, $u(t)$ as the disturbance term, the GFF can be written as

$$\left(\frac{y(t)-1}{\lambda_1} \right)^{\lambda_1} = \beta_1 + \sum_{i=2}^k \beta_i \left(\frac{X_i(t)-1}{\lambda_i} \right)^{\lambda_i} + u(t) \quad \dots \quad (2.1)$$

⁴See for a recent study : Sadiq [17].

⁵The functional forms specified by Konstar and Khouja [8], Pifer [16] and Eisner [4], where an interest rate floor is considered in the money demand function, also belong to Box-Cox family.

$t=1, 2, \dots, T$

where $\beta_1, \beta_2, \dots, \beta_k$ and $\lambda_1, \lambda_2, \dots, \lambda_k$ are the parameters.

It can be seen that

$$y(t)^{(\lambda_1)} = \frac{y(t)^{\lambda_1} - 1}{\lambda_1} = \log y(t) \text{ if } \lambda_1 \rightarrow 0$$

and

$$X_i(t)^{(\lambda_i)} = \frac{X_i(t)^{\lambda_i} - 1}{\lambda_i} = \log X_i(t) \text{ if } \lambda_i \rightarrow 0$$

$i=2, \dots, k$

Thus if $\lambda_1, \lambda_2, \dots, \lambda_k=1$, (2.1) reduces to a linear function and if $\lambda_1, \lambda_2, \dots, \lambda_k \rightarrow 0$, (2.1) reduces to a log-linear function. The money demand function in the GFF framework—which we refer to as general money demand function (GMDF) can be written as⁶

$$M(t)^{(\lambda_1)} = \beta_1 + \beta_2 y(t)^{(\lambda_2)} + \beta_3 r(t)^{(\lambda_3)} + u(t) \quad \dots \quad (2.2)$$

where $M(t)$ is real money balance (sum of currency in circulation and demand deposits); $y(t)$ is the Gross National Product (GNP) at constant market price of 1959/60; and $r(t)$ is the weighted average of the various deposit rates of commercial banks.⁷

In an attempt to avoid any exaggerated effect on the income and interest elasticities, caused by changes in the values of GNP and the interest rate, different transformation is employed on the explanatory variables.⁸ On theoretical grounds, (2.2) allows the marginal coefficients and the elasticities of demand to vary over different levels of $M(t)$,

⁶This model is based on the assumption that β_1, β_2 and β_3 are constant across the sample observations. In the case where β_1, β_2 and β_3 are assumed to be random, the estimation procedure presented below can be modified along the lines suggested by Murty [10; 11] and Murty and Murty [12].

⁷For a similar formulation see Sadiq [17].

⁸It would have been ideal to use different transformations on $y(t)$ and $r(t)$; however due to computational complexities involved in estimation, same transformation (λ_2) is assumed on $y(t)$ and $r(t)$.

$r(t)$ and $y(t)$. Writing MP_y , MP_r as the marginal coefficients with respect to GNP and interest rate respectively, and the corresponding elasticities as η_y and η_r we have

$$MP_y = \beta_1 \frac{y(t)^{\lambda_1 - 1}}{M(t)^{\lambda_1 - 1}} ; \quad MP_r = \beta_2 \frac{r(t)^{\lambda_2 - 1}}{M(t)^{\lambda_2 - 1}}$$

$$\eta_y = \beta_1 \frac{y(t)^{\lambda_1}}{M(t)^{\lambda_1}} ; \quad \eta_r = \beta_2 \frac{r(t)^{\lambda_2}}{M(t)^{\lambda_2}}$$

Because of the varying nature of η_y and η_r over each observation in the sample, the directions of the rate of change of these elasticities with respect to changes in the variable can be obtained.

Equation (2.2), as it stands, is an equilibrium relationship, and thus implies instantaneous adjustment of real money balance with the desired balance. However, in the presence of lags in the adjustment process, the GFF postulation can be modified. Thus, denoting $M(t)^*$ as the desired money balance, due to the changes in $r(t)$ and $y(t)$ at time 't', the desired money demand equations in the GFF frame can be written as

$$M(t)^* = \beta_1 y(t)^{(\lambda_1)} + \beta_2 r(t)^{(\lambda_2)} + u(t) \quad \dots \quad (2.3)$$

By specifying a partial adjustment mechanism between the desired and the actual real money balance we have

$$\left\{ M(t)^{(\lambda_1)} - M(t-1)^{(\lambda_1)} \right\} = \gamma \left\{ M(t)^* - M(t-1)^{(\lambda_1)} \right\} \quad \dots \quad (2.4)$$

$$0 < \gamma < 1$$

where γ is the adjustment parameter. If $\gamma=1$, the adjustment between the actual and the desired money balance is instantaneous.

Using Koyck's mechanism, (2.3) reduces to

$$M(t) = \alpha_1 + \alpha_2 y(t)^{(\lambda_2)} + \alpha_3 r(t)^{(\lambda_2)} + \alpha_4 M(t-1)^{(\lambda_1)} + \gamma u(t) \quad \dots \quad (2.5)$$

where

$$\begin{aligned}\alpha_1 &= \gamma \beta_1; & \alpha_2 &= \gamma \beta_2 \\ \alpha_3 &= \gamma \beta_3; & \alpha_4 &= (1-\gamma)\end{aligned}$$

By imposing restrictions on λ_1 and λ_2 , (2.5) reduces to most of the commonly used functional forms with disequilibrium assumption. The usual short-run and long-run elasticities w.r.t. $r(t)$ and $y(t)$ can be obtained, which are again varying in nature across the sample observations.

Estimation of GFF

We may obtain an estimate⁹ of the transformation vector by assuming that the disturbance term $u(t)$ in (2.2) is normally distributed with zero mean and constant variance σ^2 for some true vector $\left\{ \lambda_1^* \lambda_2^* \right\}$. Based on this assumption, the Log-likelihood function L^* , of the sample values can be written as

$$\begin{aligned}L^*(\theta/\text{data}) &= -\frac{T}{2} \log 2\pi - \frac{T}{2} \log \sigma^2 + (\lambda_1-1) \sum_t \log M(t) \\ &\quad - \frac{1}{2\sigma^2} \sum_t \left\{ M(t)^{(\lambda_1)} - \beta_1 - \beta_2 y(t)^{(\lambda_2)} - \beta_3 r(t)^{(\lambda_2)} \right\}^2 \quad (2.6)\end{aligned}$$

where θ is a vector of parameters $(\beta_1, \beta_2, \beta_3, \lambda_1, \lambda_2)$. Equation (2.6) is maximised w.r.t. the parameter vector θ .

Now for a given set of values for λ_1 and λ_2 , (2.6) is the Log-likelihood function of a standard least squares estimation. Denoting $\hat{\sigma}_{\lambda_1 \lambda_2}^2$ as an estimate of σ^2 for a given set of λ_1 and λ_2 values, the corresponding Log-likelihood function $L_{\lambda_1 \lambda_2}^*$ can be written as

$$L_{\lambda_1 \lambda_2}^* = -\frac{T}{2} \log 2\pi - \frac{T}{2} \log \hat{\sigma}_{\lambda_1 \lambda_2}^2 + (\lambda_1-1) \sum_t \log M(t) \quad (2.7)$$

⁹The estimation procedure essentially remains the same even in the disequilibrium case.

(2.7) may be computed for each $\{\lambda_1 \lambda_2\}$ in a specified grid, and the maximum likelihood estimate of $\left\{ \lambda_1^* \lambda_2^* \right\}$ is given by a vector $\left\{ \hat{\lambda}_1 \hat{\lambda}_2 \right\}$ such that

$$L_{\lambda_1 \hat{\lambda}_2}^* > L_{\lambda_1 \lambda_2}^*$$

for all calculated $\{\lambda_1 \lambda_2\}$.

Once the transformation parameters are estimated, the other parameters β_1, β_2 and β_3 , can be obtained by using the ordinary least squares procedure to the transformed data. The estimation procedure outlined above can be used to test the appropriateness of a specific functional form of the money demand equation. Since λ_1 and λ_2 discriminate the type of functional form, all the competing models are 'nested', and thus the testing may be based on the likelihood ratio criterion. It is well known that under the null hypothesis that the restricted model is true, twice the difference in the log-likelihood values of the restricted and the unrestricted models, is asymptotically distributed as a chi-square variable with the degrees of freedom being equal to the number of restrictions. For example, if the validity of the log-linear form is to be tested, under the alternative hypothesis of the GFF, we write the null and alternative hypotheses as

$$H_0 : \lambda_1 = 0, \quad \lambda_2 = 0$$

$$H_A : \lambda_1 = \hat{\lambda}_1, \quad \lambda_2 = \hat{\lambda}_2 \text{ (obtained from the GFF)}$$

writing $L_{\lambda_1 \lambda_2}^{*00}$ and $L_{\hat{\lambda}_1 \hat{\lambda}_2}^*$ as the log-likelihood values (obtained from (2.7)

under H_0 and H_A respectively, the random variable

$$2 \left\{ L_{\hat{\lambda}_1 \hat{\lambda}_2}^* - L_{\lambda_1^0 \lambda_2^0}^* \right\} \quad \dots \quad (2.8)$$

is distributed asymptotically as a Chi-square variable with two degree of freedom ; and the test can be carried out accordingly.

III. RESULTS OF ESTIMATION AND MODEL COMPARISONS

Results

Before the results of the estimation are presented, we may mention that the data used for this study consists of annual time series information relating to the period 1960/61-1975/76 ; they are taken from Sadiq [17]. The data sources, definitions etc. are given in Sadiq [17] and need not be repeated here. However, a brief note is provided in the Appendix.

The results of estimation of the GMDF, and the restricted money demand functions (Case (1) : $\lambda_1=0, \lambda_2=0$; Case (2) ; $\lambda_1=1, \lambda_2=1$; Case (3) : $\lambda_1=0, \lambda_2=1$; Case (4) : $\lambda_1=1, \lambda_2=0$) are presented in Appendix Tables A.I and A.II. Table A.I correspond to the equilibrium assumption and Table A.II to the disequilibrium assumption. For estimating the GMDF, we considered the ranges of λ_1 and λ_2 from -2.0 to 2.0 . By allowing λ_1 and λ_2 to change by 0.1 at each step, the maximum of the log-likelihood function was located. The optimum λ_1 and λ_2 values are around 2.0 and 2.0 in the equilibrium case and around 2.0 and 0.5 in the disequilibrium case.

In the equilibrium case the coefficients of income in GMDF and also in all the restricted models, is significant at 1 per cent level with a theoretically acceptable sign ; however, the coefficient of interest rate maintaining theoretical consistency is significant at 2.5 per cent level in GMDF and in cases 2 and 3 of the restricted models. The log-likelihood value is maximum for the GMDF among the alternative models. The test statistic in (2.8) computed (from the $L_{\lambda_1\lambda_2}^*$ values), for discriminating the alternative models (Table I), clearly brings out the fact that the linear form of the money demand function is acceptable¹⁰ for empirical use. The rest of the restricted models are rejected completely on statistical grounds (Table I). Even though the LI form is accepted, the estimates of the GMDF may enhance further the utility for empirical use. Mention may be made about the Durbin-Watson (DW) statistic values ; for all the models considered here the test is inconclusive.

¹⁰By comparing the explanatory power of the LI and LL formulations, Sadiq [17] arrives at the same conclusion.

TABLE I
CHI-SQUARE STATISTIC VALUES*

	Null Hypothesis (H_0)			
	$\lambda_1=0, \lambda_2=0$	$\lambda_1=1, \lambda_2=1$	$\lambda_1=0, \lambda_2=1$	$\lambda_1=1, \lambda_2=0$
Equilibrium	10.36	4.56	7.78	7.22
Disequilibrium	13.72	6.02	12.94	6.42

*Table value of Chi-square, with two degrees of freedom at 5 per cent level is 5.99.

In the disequilibrium case also, the income coefficients in all the models are significant at 1 per cent level, but only in the GMDF, the interest rate coefficient is significant at the same level. This latter coefficient does not exhibit any significance in cases 1 and 3 of the restricted models, but showed significance at 2.5 per cent level in cases 2 and 4. The adjustment parameter (γ), in all the models, turned out to be consistent as well as statistically significant. In all the models the coefficients have the correct sign. The likelihood ratio test (Table I) clearly rejects all the restricted models (with the disequilibrium assumption), for empirical use; nevertheless, among the restricted models LI performs better in terms of higher log-likelihood value.

It is well known that in the disequilibrium case, conventional DW statistic cannot be used for testing the presence of first order autocorrelation. Consequently, Durbin's H-statistic has been computed;¹¹ for all the models considered H-statistic clearly indicates absence of first order autocorrelation, unlike in the equilibrium case where the test is inconclusive.

Behavioural Properties of the Alternative Models

It is well known that the parameters associated with interest rate and GNP in the GFF cannot exhibit a clearcut distinction either as a

¹¹It may be mentioned that, test based on H-statistic is valid only in the case of large samples. As there is no alternative test available in the small samples the same statistic has been used in the present case also,

slope or as an elasticity. On the contrary in the LI and LL formulations, such distinction can be made ; LI form provides directly the marginal coefficients and LL form, the elasticities. In addition, these estimates are constant throughout the sample observations, in their respective forms. We concentrate our attention here on comparing the behavioural properties of the GMDF with the LI and LL money demand functions ; this has been done mainly on the basis of the behaviour of elasticities and the predictive performance of the models in the sample period.

Appendix Table A.III presents along with the mean level elasticities, the behaviour of income and interest rate elasticities for a few selected years, obtained from the GMDF and the LI and the LL formulations. At mean level, the income elasticities are less divergent across the models ; however the pattern of spread across the years is not uniform. The income elasticity from the GMDF and LI showed little variation upto the year 1969/70 ; however sudden increase is noticed in 1974/75, which belongs to the post independence period, and again a falling tendency in 1975/76. Though similar pattern is observed with the estimates in the linear form, they are consistently lower.

The interest rate elasticity at the mean level from the GMDF is relatively lower than those obtained from the LI and LL formulations ; however the movement of the elasticity (from GFF) is quite erratic across the sample observations, exhibiting an increasing trend upto 1974/75 and then a decreasing trend ; the elasticity has even crossed unity in 1974/75. Thus at relatively low interest rates prevailing in the pre-independence period the movement of the elasticity is not very marked, as compared to the post independence period, when the interest rate has gone up considerably. The pattern of movements in the interest rate elasticity obtained from LI form is almost similar ; they are consistently higher in the pre-independence period and lower in latter period.

The short run¹² elasticities computed from the disequilibrium models are presented in Table A.IV. The income and interest rate elasticities

¹²The long-run elasticities can be computed by dividing the short-run elasticities by the estimate of the adjustment parameter γ .

showed considerable variation in terms of the pattern as well as in magnitude across the models ; however at mean level the income elasticity obtained from the GMDF and LI formulations are almost similar.

The forecasting ability of the alternative models within the sample period has been examined by computing Theil's U-statistic value [19].¹⁸ This statistic ranges in value from zero to one ; zero value refers to a perfect forecast and one value to a negative relationship between the actual and the predicted values. Since the U-statistic is not scale invariant, it discriminates not only the collateral movement of the actual and the predicted values, but also the levels of the variables.

TABLE II
THEIL'S U-STATISTIC VALUES

	Model Type	
	Equilibrium	Dis-equilibrium
Generalised Model	0.0515	0.0377
Restricted Models		
Case (1) $\lambda_1 = 0, \lambda_2 = 0$	0.0585	0.0423
Case (2) $\lambda_1 = 1, \lambda_2 = 1$	0.0551	0.0394
Case (3) $\lambda_1 = 0, \lambda_2 = 1$	0.0540	0.0417
Case (4) $\lambda_1 = 1, \lambda_2 = 0$	0.0606	0.0400

Although the differences between the forecasting ability of the alternative models are not marked, it is clear from Table II that the generalised model maintains its superiority in view of a lower U-statistic value. This is again supported by the presence of relatively higher explanatory power (R^2) in the GMDF, over the restrictive models (See Tables A.I. and A.II).

¹⁸The U-statistic has been computed as

$$U = \sqrt{\frac{\sum_t (A(t) - P(t))^2}{\sum_t (A(t))^2 + \sum_t (P(t))^2}}$$

where $A(t)$ is the actual value and $P(t)$ is the predicted value.

IV. CONCLUSIONS

A generalised money demand function, based on Box-Cox parametric transformations, has been estimated for Bangladesh. This generalise form reduces to the linear, semi-log and log-linear forms, under certain restrictions.

By incorporating different transformations, and by considering equilibrium and disequilibrium versions, the estimates of the generalised money demand function, have been compared with those obtained from the restrictive models. A log-likelihood test has been carried out for choosing an appropriate functional form for the Bangladesh economy. Our results indicate that linear form is appropriate for the equilibrium version of the money demand function, while in the disequilibrium version, none of the restricted models seems to be appropriate. The behavioural properties of the alternative models have been examined by considering the movement of income and interest rate elasticities in the sample period. Substantial variations in the elasticity estimates have been noticed for a few years in the sample period. The mean level elasticities—both income and interest rate—obtained from the GMDF (in both equilibrium and disequilibrium versions), are always lower than those obtained from the LI and LL specifications. The empirical performance of the alternative models in terms of their predictive ability has been examined. Theil's U-statistic constructed for this purpose revealed the superiority of generalised money demand function.

It may be mentioned that the incorporation of other variables viz., lagged real GNP, expected rate of change in the price level (See, Sadiq [17] ; Trivedi [20] etc.) in the generalised money demand function may enhance further the utility of the model for evolving realistic monetary policies.

Further, it would have been ideal to use quarterly series rather than the annual series that is used here. However, the present study may be viewed as a first step in identifying the appropriate functional form of the demand for money in Bangladesh.

TABLE A. I

PARAMETER ESTIMATES FOR THE EQUILIBRIUM MONEY DEMAND EQUATION^a

Model	β_1	β_2	β_3	λ_1	λ_2	R ²	Durbin Watson	* c L $\lambda_1\lambda_2$
Generalised Functional Form	19.5709 (49.3686) ^a	1.3653* (0.2664)	-3.1421** (1.1923)	2	2	0.7596 ^b	1.3548	-10.93
Restricted Functional Forms								
Case 1 : $\lambda_1=0, \lambda_2=0$	-0.0862 (0.9783)	1.1762* (0.3362)	-0.2263 (0.1243)	0	0	0.5711	1.4313	-16.11
Case 2 : $\lambda_1=1, \lambda_2=1$	0.7134 (5.3156)	1.2647* (0.2941)	-0.8974** (0.3959)	1	1	0.6806	1.3777	-13.21
Case 3 : $\lambda_1=0, \lambda_2=1$	2.0969* (0.2998)	0.0628* (0.0166)	-0.0532** (0.0223)	0	1	0.6432	1.5249	-14.82
Case 4 : $\lambda_1=1, \lambda_2=0$	-43.4297** (17.3962)	23.5607* (5.9788)	-3.7626 (2.2114)	1	0	0.6138	1.2939	-14.54

a Numbers in parantheses are asymptotic standard errors.

b R² for the Generalised Model has been obtained for the transformed data at the optimum values of λ_1 and λ_2

c L* is calculated by ignoring the constant term (i.e., $-\frac{T}{2} \log 2\pi$)

* These estimates are statistically different from zero at 1 per cent level of significance.

** These estimates are statistically different from zero at 2.5 per cent level of significance.

Note : The constant terms (β_1) in cases (2), (3) and (4) refer to the transformed data. The actual term(β_{1A}) for the untransformed data can be obtained for all the cases as :

Case (2) : $\beta_{1A} = (\beta_1 - \beta_2 - \beta_3 + 1)$; Case (3) : $\beta_{1A} = (\beta_1 - \beta_2 - \beta_3)$; Case (4) : $\beta_{1A} = (\beta_1 + 1)$.

TABLE A. II
PARAMETER ESTIMATES FOR THE DIS-EQUILIBRIUM MONEY DEMAND EQUATIONS

Model	α_1	α_2	α_3	α_4	λ_1	λ_2	R^2	Durbin's H	Durbin's $L^* c$ $\lambda_1^* \lambda_2$
Generalised Functional Form	-333.5265* (105.4565) ^a	77.3162* (17.3355)	30.4528* (10.9102)	0.5150* (0.1200)	2	0.5	0.8890 ^b	1.5019	-6.21
Restricted Functional Forms									
Case 1 : $\lambda_1=0, \lambda_2=0$	-0.5565 (0.8073)	0.8483* (0.2977)	-0.2035 (0.1005)	0.4637 (0.1755)	0	0	0.7473	1.0623	-13.07
Case 2 : $\lambda_1=1, \lambda_2=1$	-2.2659 (4.1098)	0.8980* (0.2516)	-0.7455* (0.3016)	0.4535 (0.1473)	1	1	0.8861	0.6587	-9.22
Case 3 : $\lambda_1=0, \lambda_2=1$	1.1628* (0.4936)	-0.0469* (0.0159)	-0.0435 (0.0176)	0.3924 (0.1769)	0	1	0.7608	0.8736	-12.68
Case 4 : $\lambda_1=1, \lambda_2=0$	-32.5644** (12.4417)	16.2642* (4.6195)	-3.6158** (1.5346)	0.5206* (0.1452)	1	0	0.8310	0.8839	-9.42

a Numbers in parentheses are asymptotic standard errors.

b R^2 for the Generalised Model has been obtained for the transformed data at the optimum values of λ_1 and λ_2 .

c L^* is calculated by ignoring the constant term (i.e., $-\frac{T}{2} \log 2\pi$).

* These estimates are statistically different from zero at 1 per cent level of significance.

** These estimates are statistically different from zero at 2.5 per cent level of significance.

Note : See Note in Table A.I.

TABLE A. III
ELASTICITY ESTIMATES (FROM EQUILIBRIUM MODELS) FOR
SELECTED YEARS

Year	Generalised Model	Restricted Models	
		$\lambda_1=0, \lambda_2=0$	$\lambda_1=1, \lambda_2=1$
Income Elasticity			
1960/61	1.2261	1.1762	1.1985
1963/64	0.9373	1.1762	1.0478
1966/67	0.9936	1.1762	1.0789
1969/70	1.0757	1.1762	1.1225
1974/75	2.6825	1.1762	1.7727
1975/76	1.7299	1.1762	1.4236
Mean level	1.1055	1.1762	1.1381
Interest Rate Elasticity			
1960/61	-0.1058	-0.2263	-0.1647
1963/64	-0.0593	-0.2263	-0.1233
1966/67	-0.0948	-0.2263	-0.1559
1969/70	0.1269	-0.2263	-0.1803
1974/75	-1.4044	-0.2263	-0.5999
1975/76	-0.8777	-0.2263	-0.4743
Mean level	-0.1628	-0.2263	-0.2043

TABLE A. IV
SHORT RUN ELASTICITY ESTIMATES (FROM DISEQUILIBRIUM
MODELS) FOR SELECTED YEARS

Year	Generalised Model	Restricted Models	
		$\lambda_1=0, \lambda_2=1,$	$\lambda_1=1, \lambda_2=1$
Income Elasticity			
1960/61	1.1621	0.8484	0.8510
1963/64	0.6797	0.8484	0.7440
1966/67	0.6511	0.8484	0.7661
1969/70	0.5748	0.8484	0.7971
1974/75	2.1908	0.8484	1.2588
1975/76	1.2719	0.8484	1.0108
Mean level	0.8003	0.8484	0.8081
Interest Rate Elasticity			
1960/61	-0.2014	-0.2035	-0.1368
1963/64	-0.1090	-0.2035	-0.1024
1966/67	-0.1157	-0.2035	-0.1294
1969/70	-0.1077	-0.2035	-0.1498
1974/75	-0.5959	-0.2035	-0.4984
1975/76	-0.3433	-0.2035	-0.3940
Mean level	-0.1585	-0.2035	-0.1697

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Appendix

The basic data used in the present study are adopted from Sadiq [17]—Appendix Table I (SAT). All data refer to annual time series covering the period ; 1960/61—1975/76.

The nominal money supply is taken as the sum of currency in circulation and demand deposits. The yearly series is obtained by taking the average of the monthly figures. The real money series is obtained by using the implicit GNP deflator with the base 1959/60 (i.e., the last column in SAT).

The real income variable refers to GNP at constant prices of 1959/60 (i.e., the fourth column in SAT) ; the interest rate variable, is the weighted average of the various deposit rates of commercial banks in Bangladesh (i.e., the third column in SAT). It is to be noted that, the organised money market is not very prominent, more so after independence in Bangladesh, and thus the interest rate variable considered here may be more appropriate (See also Sadiq [17]).

On the Mixed Blessing of Tied Aid*

by

CARL HAMILTON**

I. INTRODUCTION

The purpose of this paper is to analyze some of the problems that arise when a developing country finances its development by means of tied foreign aid. Compared with untied aid, tying of aid leads to a constraint on the recipient's freedom of action in allocating his resources in the best possible way. Thus the constraint causes the recipient a welfare loss.

It is appropriate to classify tied aid into three different main types. Firstly, aid tied to a certain *country of source* and sometimes also to a certain supplier in that country for the procurement of goods and services. Secondly, aid tied to certain *commodities or services*. Finally, aid can be tied to a certain *project*, in particular to the import component. Two or all three of these types of tying frequently occur simultaneously.

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Next section of this paper discusses some general costs associated with any kind of tied aid. The following sections highlight the special problems created by each of the three types of tying mentioned above.

II. ADMINISTRATION AND NEGOTIATION COSTS OF AID

The international discussion of aid has usually ignored the recipient's costs of negotiating and administering aid in general, and different types of aid in particular.¹ Hence a very limited empirical material was collected from eight Swedish Development Cooperation Offices by means of interviews with the purpose of ascertaining how a recipient regards the administrative demands on his country which accompany foreign aid.²

From these interviews it is quite obvious that different donors *different* demands on preparatory routines, information, reporting etc. involve a great deal of extra work for the recipient. As an example, administrators in government departments in recipient countries could be released for more productive tasks instead of such work as is now being given second priority for the benefit of contacts etc. with donors. Missions, such as those from the World Bank, are felt to be particularly resource demanding as they require a great deal of local service from the hosts. Against these costs should of course be weighed the benefits that these missions may yield.

A second result of donors' *different* demands on the administration of the recipient country is that overall planning may be delayed, which implies a social cost for the recipient. Against this should be weighed the benefits that the extra time spent on the project may yield. However, it is not unusual for the recipient to have to work out several different presentations of the same project in order to satisfy special demands made on the design of the project report by different financiers of the project (production of "project cosmetics").³

¹An exception is White [29].

²See Hamilton [12].

³See e.g., White [30].

Foreign aid allows the recipient country to increase its import of goods and services. The recipient, as well as the donor, has an interest in the greater import capacity being utilized in the most efficient way possible. It is true that competitive international procurement requires time, money and a staff with experience and skill, but if it is efficiently carried out it can yield great savings by way of lower purchase prices and lower future operating costs. Experiences from the United Nations Institute for Training and Research's (UNITAR) seminars on procurement and some of the collected empirical material show that developing countries lack routine and knowledge of procurement procedures. This is true, above all, of the poorest of these countries.⁴

The following recommendations, if observed, could cut the recipient's administration and negotiation costs : (1) *The recipient* should work out agreements with donors regarding simpler donor-recipient routines and demands. (2) Donors should make commitments on the volume and design of their aid for several years ahead. This reduces the costs arising from improvisations, short-term foreign loans etc. (3) Decision makers in donor countries should be restrictive in their demands for information from recipients, in view of the fact that this may lead to a non-optimal allocation of resources on collection of information. (4) In the recipient country, there should be a well qualified donor representation with a low turnover of stationed staff. (5) The recipient's total grant should be placed so as to yield from the day on which the grant is in principle available for aid to the recipient (e.g., from the first day of the fiscal year). (6) Donors can initiate training of purchasers and act as a purchaser on international markets *at the request of the recipient*, if this would increase the efficiency of the aid. It goes without saying that such an arrangement should not lead to any informal tying of the aid.

III. AID TIED BY SOURCE

When the donor ties the recipient's procurement to a certain country it is usually to the donor country itself. In some cases the donor also specifies suppliers. Tying by source may take various forms. One form is written agreements between donor and recipient. Tying

⁴See also Westring [28] and White [31].

can also be *informal* and be brought about through pressure, injunctions, "gentlemen's agreements" etc. The fact that no written agreement exists regarding tying does not by itself prove that solely untied aid is given.⁵ Two other forms of aid tied by source are government credit guarantees and own personnel supplied or often enforced by the donor.

One case where aid tied by source appears as valuable as untied aid is when the recipient, without any ties to a specific supplier, would have imported from the donor country for at least the same amount as the total grant of source-tied aid (provided that the price is the same in both cases). If, without source-tying, the recipient would have imported for less than the grant, the tying will be partly illusory, partly effective. It should be noted that source-tied aid from a donor country with a smaller range of exportable commodities and experts is more difficult for the recipient to utilize than if the same amount of source-tied aid had come from a large donor country. But even an illusory tying imposes costs on the recipient. The recipient must, for instance, register trade between the donor and himself to ascertain that an agreement over country of source and supplier is fulfilled. An equally extensive checking of trade seems unwarranted with untied aid.

In cases where source-tying is effective the cost of commodities and services purchased with aid funds tied to source should be compared with the cost of commodities purchased with untied aid on the world market or after free international tendering. Only if the desired commodities are available at *world market prices* in the donor country, will an effective tying not cause the recipient any excess cost (adjustment costs will exist nevertheless).

As regards personnel assistance tied by source, it should first be investigated as to whether the alternative of an expert tied by source is (i) another foreign expert or (ii) one from the recipient country or (iii) no expert at all. If the alternative is *another foreign expert*, the excess cost is, firstly, the difference between his salary and that of a foreign expert who is paid out of aid given in the form of ready cash. Secondly, one must take into account whether the expert pays tax in

⁵Bhagwati [4], Morton [19].

the recipient country, in what currency the salary is paid, how much of the salary is brought into the country and spent locally as well as any differences in fringe benefits. If the alternative expert is a *national of the recipient country*, a shadow exchange rate must be used in all comparisons with the cost of an imported expert. If an expert is forced upon the recipient country by the donor, then the alternative is no expert at all. The excess cost is then equal to all the costs that the expert causes the recipient.

If a country grants source-tied aid, firms of the donor country become more competitive than firms of other countries. Such favouring of a country's own producers discriminates against the potential producers of the recipient country, as well as exporters of other developing countries. As it is predominantly industrial countries which give source-tied aid, a trade pattern favourable to these countries as a group is maintained.

IV. AID TIED TO CERTAIN COMMODITIES AND SERVICES

The reason for tying aid to certain commodities and services can be that the donor doubts the recipient's ability to choose the correct instruments—from the donor's point of view—to reach the development objectives accepted by both parties. Another reason might be that the donor does not share the recipient's overall development objectives and tries to reach his own objectives for the recipient country by not leaving the choice of instruments to the recipient. From experience, however, it is well known that it is difficult in the long run for the donor to realize objectives of his own through aid when the objectives are not in agreement with those of the recipient country, for instance in matters concerning income distribution. A third reason is, of course, that the donor tries to enhance political objectives which are important domestically to the donor country government, for example claims that tying will result in increased employment and less strain on the balance of payments (Callies [6], Colaco [9], Goppers [11]). Often, commodity-tied aid is also source-tied. To the extra costs discussed below should usually be added the excess cost of so-called double tying.

The value to the *recipient* of a grant equals the amount of money that the consumers of the recipient country would be prepared to pay for the grant. One way of estimating this willingness to pay is to find out whether the recipient can in turn sell the grant on the world market and use the revenue at his own discretion. The revenue from an imaginary sale of this kind is generally a reasonably correct measure of the value of the grant from the recipient's point of view, even if the method leads to some systematic overrating—e.g., the recipient does not generally receive the mix of commodities he alternatively would have bought.⁶ An analysis of commodity aid can be summarized under three headings : adjustment cost, effects on resource allocation, and effects on income distribution.

Let us assume that the recipient is granted a certain commodity, such as wheat, in the form of aid. The commodity could also have been some other agricultural product, a manufactured good, etc.

Adjustment Cost : We assume that the grant of wheat completely replaces a planned commercial import of wheat. It would perhaps seem in such a situation that commodity aid does not cause the recipient any excess cost. He can save foreign exchange by reducing his commercial import of the commodity in question and increase other imports ; wheat aid is transformed by the recipient into an amount of freely disposable foreign exchange.⁷ This argument is correct in the long run. There are, however, some adjustment costs.

The donor's motive for tying his aid to a certain commodity, such as wheat, is often that he wishes to impress domestic public opinion by showing that the money has gone to needy people or refugees and has not been pocketed by corrupt politicians or blackmarketeers. One way of channeling aid to target population groups may seem to

⁶Hamilton [12]. The difference in the donor's and the recipient's valuations of the grant has been illustrated in the discussion of the value of United States grain shipments to developing countries in the 1950's and 1960's. Since the United States had little alternative use for the grain, its value to that country was considerably lower than a valuation at then current world market prices indicates. See Mayer [18], Pincus [20] and Schultz [23], Isenman and Singer [13].

⁷This case is the same as if the country receives a terms-of-trade improvement.

be to supply it in the form of food, blankets, tents etc. If the recipient adjusts well and cuts his commercial import of the commodity in question (food, blankets, tents etc.) correspondingly, the donor's endeavours will have been in vain. However, if the recipient is very clever at transforming tied aid into untied foreign exchange, he may jeopardize his goodwill with the donor and thus prospects of future aid. A second objection is that transforming commodity aid into foreign exchange requires a certain amount of time for preparation as well as an administration with a good general view of the foreign trade situation. The administration cannot generally be assumed to be efficient enough to administer the necessary replanning of the country's commercial imports in a proper manner with short notice. A likely result is that the foreign trade administration will increase and such an expansion of the bureaucracy may entail considerable social costs.

When does commodity-tied aid give rise to a net increase in total import, i.e., commercial import plus commodity aid ? Firstly, when the commodity-tied aid is given with short notice and the recipient lacks the administrative capacity to make quick adjustments. The typical case is disaster aid (the short run case). Secondly, when commodity tied aid takes on a permanent character. Then the recipient adjusts and as a result his overall import capacity improves. The increased capacity will be used for increased import of many goods and services and among others probably the commodity the recipient also receives in the form of tied aid. In this way there will be an increased import of the commodity in question just as in the case of increased untied aid or an improvement in the terms of trade (the long-run case).

Effects of Increased Imports on Resource Allocation : The first step in the analysis is to study whether the grant causes not only an increase in total imports but also an increase in the total supply of the commodity in the recipient country (of for instance wheat) or if the grant releases factors of production which alternatively would have been employed in production of the commodity. In the case where the total supply of e.g., wheat in the recipient country increases by the entire quantity of the wheat aid, the value of the aid is the amount that consumers are prepared to pay for the *incremental* supply, i.e., in this case the entire quantity of food aid,

The second case is when the total supply of wheat increases by less than the total aid, i.e., domestic production decreases and domestic factors of production, such as labour, are released from the production of wheat. In order to evaluate this effect, a social cost-benefit analysis should be made of the resources released in domestic wheat production, viz. how many man-hours become redundant in the domestic wheat production, and how much are the new employers if there are any—prepared to pay for these man-hours?⁸

The general conclusion is thus that commodity aid may hamper domestic production. There are, however, four exceptions to this rule : (1) If the market price is not influenced by the food aid ; this can happen if (1 : i) the aid is marginal, (1 : ii) when there is price control so that the prices producers face are not influenced by the price paid by consumers, or (1 : iii) the supply curve is vertical. (2) If there is a counteracting increase in demand initiated e.g., through government fiscal and monetary policy. (3) When producers do not expect the *future* price of their output to fall, e.g., when producers in a disaster situation think that food aid is purely temporary. It is crucial how producers form their expectations about future prices and if the government can influence the formation of expectations. (4) Permanent food aid can result in increased domestic production if it is used for e.g., financing land improvements and other reforms in the agricultural sector.⁹

Indirectly, however, there should also be an increase in real incomes elsewhere in the economy which would counteract some of the disincentive effect.

⁸When food grants are given to centrally planned economies the disincentive effect on domestic production will remain, but could be channeled through plans and government instructions, rather than through the price mechanism.

⁹A further question is whether the total volume of *marketed* grain increases or decreases due to food aid (assuming that the total grain production is unchanged) i.e., is there a backward sloping supply curve ? Since the individual farmer is both a producer and a consumer of grain, he can react to a price reduction by choosing to retain more than previously for his own and his family's consumption. If all farmers increase their self-consumption, the aggregate marketed surplus will decrease. There are, however, also arguments which point to reduced self-consumption being the more likely reaction ; when the price falls, the farmer must market more of his total production and consume less in order to keep his cash income unchanged. See e.g., Askari and Cummings [2] and Bhawgwati and Chakravarty [5, pp. 32-38].

Effects on Income Distribution : In a developed economy a fall in prices in a sector would lead to adjustment problems, but after a period, labour and other factors of production can be expected to find employment in other sectors, perhaps due to an active labour market policy. In any event, groups exposed to structural changes can be compensated, wholly or in part, by fiscal and social welfare policy measures.

In a typical developing country, efficient policy instruments very rarely exist which can smooth out a structural change and compensate groups that are hit. This means that employees in a sector where profitability is reduced will carry the adjustment problems entirely on their own shoulders. Since people have a low standard of living to start with, adjustment problems are naturally especially serious.

Empirical studies of effects of commodity aid have been carried out, above all in India, in connection with grain shipments from the United States.¹⁰ These shipments took on a permanent character. One point of view is that the Indian authorities, having the U.S. grain at their disposal, did not feel obliged to carry out needed institutional reforms which could have paved the way for a more egalitarian income distribution. Against this view one could argue that it would be to overemphasize the importance of U.S. food aid if one believed that aid alone could have had a major impact on the long-run development of the agricultural sector and income distribution of India. Generally speaking, the long-run effects depend much more on the political objectives of the government of the recipient country and its capacity to enforce these objectives given its national and international feasibility constraints.¹¹

¹⁰Bhagwati and Chakravarty [5], Fisher [10], Isenman and Singer [13], Mann [17], Rogers, Srivastava and Heady [22], Schultz [23] Sen [24], Streeten and Hill [27].

¹¹Even if the Indian government through various measures may have prevented a decrease in domestic agricultural production, one should ask the following "cost-effectiveness" question : given the shipments, could India, at a lower social cost have had the same supply and distribution of agricultural products, by pursuing a different (economic) policy ?

V. PROJECT-TIED AID

Project-tied aid means that the aid is linked to a specific project in the recipient country. Two motives for project-tying are common. First, the donor government wants, for domestic policy reasons, to be able to identify its contribution to the recipient country and point to a factory, a school or an irrigation plant. Secondly, the donor may consider the recipient not quite able or willing to take care of aid in the right way from the donor's point of view. Project aid is often combined with both source-tied and commodity-tied aid : a triple tying.

That aid is tied in a conspicuous way to a certain project only in exceptional cases means that that particular project is actually financed by the donor. In an evaluation of the donor's contribution the *marginal activity*¹² in the recipient economy should be analyzed. However, the donor can often influence the *formulation* of a project, e.g., the choice of techniques. This is particularly important, and often disturbing as the project often is a high priority one from the recipient's point of view.

If the recipient was granted untied aid and then would have formulated the project in a manner different from the case of project-tied aid, one can draw the conclusion that the tied form causes the recipient excess costs. Some frequently-heard critical observations are summarized below.¹³

(1) With project-tied aid, a technique is often chosen that is *too capital-intensive*. This is because the donor often is prepared to finance only imported goods and services which will be used in the project and that personnel trained in industrial countries will work with the project. It has been claimed that donor-imposed techniques are "inappropriate" in other respects as well, e.g., creating a "technological dependence". (2) Aid has preferably been given to projects in the *modern urban sector*. There are at least two additional cost items in an urban project compared with one in the agricultural sector : the

¹²Cf. Singer [25] who incorrectly stressed marginal projects in the development plan instead of the marginal activity in the economy.

¹³Alamgir [1], Bauer [3], Clark [7], Clifford [8], Little [15] Little and Clifford [16], Radetzki [21], Singer [25 ; 26], White [29].

social cost of migration from rural to urban areas, and the disadvantages of a possibly more uneven income distribution within the urban sector.¹⁴ (3) Aid is more often given to *large projects* than to small ones. From the donor's point of view it is less risky to administer a few large projects than many small ones. In addition, each project entails a high fixed cost for the donor. (4) Aid is more willingly given to *new projects* than to the extension and maintenance of those already existing. (5) In project-tied aid, when the donor finances imported commodities and services only during the investment phase of the project, future costs are often underestimated and pose great problems later on.

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¹⁴Note, however, that aid to the urban sector may well have effects also in the rural sector. If e.g., food aid is given to the urban population, this will result in a greater part of the rural surplus being left in the rural sector and hence lower prices will face rural consumers who buy on the market. Producers, however, will suffer from the lower prices unless they are able to pay lower wages and hence keep hired labour's real wages unchanged. The ultimate income-distributional effect will depend on the institutional setup in the rural sector.

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On Critical Investment Rates

by

JAMES McINTOSH*

I. INTRODUCTION

One of the crucial questions facing many less developed countries is whether the proportion of their national product invested is sufficient to generate self sustaining growth. Although this is basically an empirical problem, obtaining unambiguous yet robust results is extremely difficult. There are several reasons why this is the case. First, realistic models which capture the dualistic structure of low income countries generate sectoral investment allocation problems as well as those involving the volume of investment. Secondly, when population growth is endogeneous, investment allocations and even the choice of project may determine the success of a development plan. Finally, there are technical complications.

This paper provides a partial answer to this important question by simulating an estimated version [4] of a model [3] specifically designed to analyse the dynamics of the development process. Although the results presented here are not completely satisfactory in the sense that they do not fully overcome the difficulties mentioned above the methodology employed is less subject to the usual criticisms levelled at "World Dynamics" type models [2 ; 5].¹ As an alternative, simulating a carefully specified econometric model based on a particular country (in this case Taiwan) has much to recommend it. The parameters on which the simulations depend have been obtained in a way which is consistent

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¹See Carter [1] for a brief summary of these models.

with the data generated by a country whose historical development is reasonably well described by the model. This approach is, therefore, superior to that of selecting model specifications or parameter values on the basis that they are *a priori* reasonable. Of course it does not follow that just because a model is relevant to a particular country it can be used to provide useful information about critical investment rates in general or for a group of countries whose institutions, factor endowments, and initial conditions do not correspond to those of post-war Taiwan. However, it is the author's belief that a carefully designed set of simulations of the Taiwanese model can yield important information of a fairly general nature on the qualitative outcome of capital accumulation programmes. The arguments which support this claim are found in section IV.

The structure of the paper is as follows. Section II contains the model and brief description of its more important features. The results of some long run simulations are reported in section III as well as some of the technical difficulties that arise when non-linear equilibrium methods are used. Finally the paper ends with concluding remarks some of which relate critical investment rates in Taiwan to those of other countries.

II. THE MODEL

The model is based on a two capital good version of the dual model [3]. Population growth is endogenous and the dual structure of the model is extended to describe demographic factors as well. Although, once invested, capital cannot be re-allocated labour, outputs and factor and commodity prices are determined by market clearing conditions. In particular labour and goods are free to flow from either sector in response to changes in relative prices. The production of goods and the rate of population growth (which depends on the allocation of labour) are thus determined simultaneously along with relative prices in a two sector dynamic general equilibrium system.

First the notation is defined ; then the model, defined by 15 equations, follows. The lower case Greek letters are elasticities whose estimated values appear in table I. The subscripts M and A represent manufacturing and agriculture, respectively.

Notation

- S = Share of employment in manufacturing
 s = Farmer's supply of food function
 d = Manufacturing wage earner's demand for food function
 E = Total employment
 g = $1 +$ rate of population growth ($g=1+n$)
 w = Wage rate in manufacturing sector
 Y_M = Output in manufacturing
 Y_A = Output in agriculture
 L_M = Employment in manufacturing
 L_A = Employment in agriculture
 p = Price of food in terms of manufactured good (internal terms of trade)
 N = Total population
 K_M = Capital stock in manufacturing, Δ_M is its depreciation rate
 K_A = Capital stock in agriculture, Δ_A is its depreciation rate
 Y = National income
 $y_M = Y_M/L_M$
 $y_A = Y_A/L_A$

Structural Equations

$$S = c_1 w^{\lambda_w} p^{\lambda_p} \quad (1)$$

$$s = c_2 y_A^{\sigma_y} p^{\sigma_p} \quad (2)$$

$$d = c_3 w^{\delta_w} p^{\delta_p} \quad (3)$$

$$E = c_4 N \quad (4)$$

$$g = c_5 S^{\gamma_S} \quad (5)$$

$$w = c_6 (K_M/E)^{1/(1+\lambda_w)} p^{\lambda_p/(1+\lambda_w)} \quad (6)$$

$$y_M = c_7 (K_M/L_M)^{\theta_M} \quad (7)$$

$$y_A = c_8 (K_A(-1)/L_A)^{\theta_A} \quad (8)$$

Identities

$$L_M = SE \quad (9)$$

$$L_A = E - L_M \quad (10)$$

$$Sd = (1-S)s \quad (11)$$

$$N(t) = g N(t-1) \quad (12)$$

$$K_M(t) = i_M Y + (1-\Delta_M) K_M(t-1) \quad (13)$$

$$K_A(t) = i_A Y + (1-\Delta_A) K_A(t-1) \quad (14)$$

$$Y = Y_M + pY_A \quad (15)$$

TABLE I

PARAMETER ESTIMATES²

Parameter	Value
λ_w	0.321
λ_p	-0.061
σ_y	1.102
σ_p	0.670
δ_w	0.209
δ_p	-0.150
γ_S	-0.056
θ_M	0.916
θ_A	0.371

²The statistical properties of the estimates and the estimation procedure used to derive them are to be found in [4, section 3].

Equation (1) says that the share of labour offered to the manufacturing sector depends on wages and the price of food. $\lambda_w > 0$ and $\lambda_p \leq 0$ since higher wages make non-farm employment relatively more attractive ; on the other hand higher food prices make farming more profitable and living in the manufacturing sector more expensive. Equations (2) and (3) are straightforward supply and demand functions with $\sigma_y > 0$, $\sigma_p > 0$, $\delta_w > 0$ and $\delta_p < 0$. Equations (7) and (8) describe the productive process by Cobb-Douglas surrogate production functions. In equation (4) employment is a constant proportion of the population. Given the massive decline in fertility rates one might have expected a reduction in dependency rates to show up as an increase in the employment rate. However this did not occur, partly because of the migratory patterns that accompanied the fertility decline. Equation (6) is just another way of writing the equilibrium condition in the labour market.⁸

In order to have a demographic mechanism which is consistent with observed fertility differentials between agriculture and non-agriculture equation (5) has S , the share of employment, as its argument. What is special about this theory is that no other variable appears. When a society has two sectors which are growing at different rates the aggregate growth rate may be approximated by

$$n = S n_M + (1-S) n_A \quad (16)$$

where the n_i are the sectoral growth rates. Now the accuracy of the approximation depends on how well S measures the sectoral distribution of the total population. For Taiwan S works fairly well. Making n_M and n_A depend on S was a convenient way of building into the model the fact that age specific fertility rates responded to modernization much more slowly in the agricultural sector (it was the shift in the population's centre of gravity and the reduction in urban and semi-urban fertility rates that accounted for largest part of the fall in the birth rate). To be sure the simulation results depend on the form of equation (5). But what is important to realize is that it is the presence of a population distribution measure (a logical requirement when $n_M \neq n_A$) that matters. Similar results would be obtained if n_M and n_A were written

⁸See [4, Section 2] for details.

as functions of other variables like their respective sectoral per capita incomes, levels of educational attainment, and infant mortality rates.

The identities require little comment ; (11) says that the supply and demand for food must be equal, a condition which determines the relative price of food. (12), (13) and (14) generate the system's dynamics ; i_M and i_A are proportional investment rates. It is these two parameters which are varied to provide all of the simulation results.

III. CRITICAL INVESTMENT RATES

Some of the model's long run characteristics can be seen by looking at results shown in table II. These help to locate the "critical investment frontier", but they are of some interest in their own right. Notice that in the first column a gross investment rate of 13 per cent with 10 per cent allocated to manufacturing and 3 per cent to agriculture generates a monotonic expansion of the value of output per worker in each sector. Different allocations which devote a larger proportion of investment to agriculture lead to paths with lower per capita income in every period and in the third column the 8 : 5 allocation leads to an absolute decline in y_N and py_A . Thus a unit of investment has a higher value if it is placed in the manufacturing sector !

TABLE II

VALUES OF y_N AND py_A FOR VARIOUS VALEUES OF i_M AND i_A
FOR $\Delta_M = 0.025$ $\Delta_A = 0.015$

Period	Normalized on 1951 Values					
	$i_M = 0.10$		$i_M = 0.09$		$i_M = 0.08$	
	$i_A = 0.03$		$i_A = 0.04$		$i_A = 0.05$	
	Y_M	py_A	Y_M	py_A	Y_M	py_A
1	1.00	1.00	1.00	1.00	1.00	1.00
20	1.30	1.11	1.17	1.00	1.05	0.90
40	1.51	1.24	1.23	1.03	0.99	0.86
60	1.72	1.39	1.29	1.07	0.95	0.82
80	1.97	1.57	1.34	1.11	0.91	0.79
100	2.23	1.75	1.40	1.15	0.87	0.77

TABLE III

OUTCOMES OF 100 PERIOD SIMULATIONS FOR VARIOUS
VALUES OF i_M AND i_A

	i_M .08	.09	.10	.11
i_A				
.02	—	—	+	+
.03	—	—	+	+
.04	—	+	+	+
.05	—	+	+	+

Two factors account for this. First, the capital elasticity of output is much higher in the manufacturing sector than it is in agriculture ($\theta_M = .92$, $\theta_A = .37$) so that transferring labour into manufacturing raises its productivity. However, agriculture is sufficiently productive to support the expansion of manufacturing employment without excessively large increases in wage rates. The mechanism whereby this occurs involves equations (1) and (6). Labour allocation depends on wages and prices and productivity increases have a depressing effect on wages through the price of food since the wage rate required to attract a given amount of labour to the manufacturing sector falls as the price of food falls. But this is not the most important reason, even if $\theta_M = \theta_A$ there would be a gain from investing in the manufacturing sector since this causes the population to shift towards the lower population growth sector. One of the surprising features of Taiwanese economic development was the resistance to modernization of traditional attitudes to family size in rural areas. There is very little in the way of a demographic payoff to investing in agriculture ; after 100 periods the population under 10 : 3 was only 64 per cent of the 9 : 4 path.

The above result has to be interpreted with some care ; it is not an argument against investing in agriculture. For those countries which try to develop through industrialization it should serve as a warning that if the benefits of lower birth rates are to be obtained early in the industrialization programme it will have to involve reallocating large

portions of the population in urban areas.⁴ It also casts some doubt on the wisdom of the "new thinking" in development theory which puts

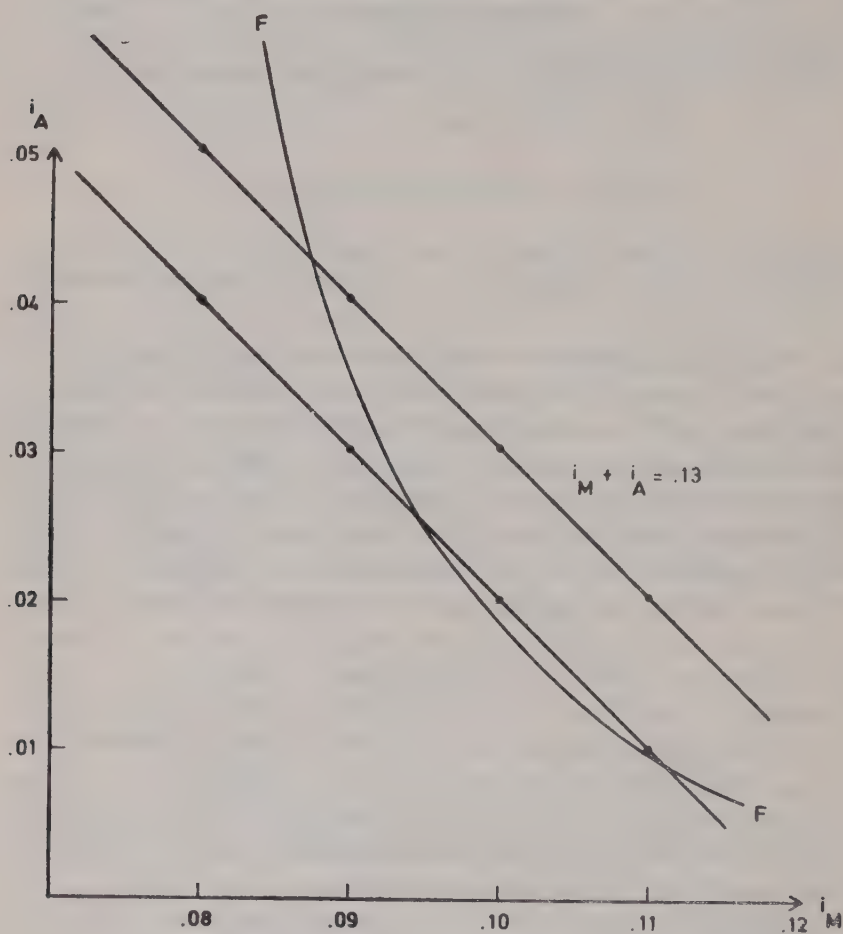


Figure 1

⁴This type of policy may not be feasible. Many industrialisation plans have not been able to provide the employment opportunities necessary for such a large population reallocation. It also may be undesirable for other reasons.

agriculture first.⁵ Unless these investment strategies create an institutional environment which is conducive to the rapid adoption of small nuclear family sizes they will be no more successful than the old fashioned policies of pushing heavy industry at the expense of everything else.

Tables II and III show that the critical investment frontier, if it exists, must be downward sloping in the (i_M, i_A) space and have slope less than -1 . See figure 1.

The introduction mentioned that there were technical problems. These arise because the model is highly non-linear. It was impossible to get much information on the model's long run properties through simulation experiments. The reason for this is not clear ; it may be caused by the presence of multiple solutions or the model may have "strange" characteristics of the type considered by Takens and Ruelle [6]. Although a proper long run analysis of the model is impossible, the simulations provide enough information to compare various investment strategies.

IV. COMMENTS AND CONCLUSIONS

The fact that Taiwan is a special case can be used to great advantage in deriving critical investment rates. I want to argue that Taiwan represents the lower bound : other countries will have to save and invest at rates to the right of the FF frontier in figure 1 if they want to insure their development.

There are a number of features of the estimated model that makes it rather different from any of the L.D.C. stereotypes. In the food market both the farmers supply function and the wage earners demand functions are atypical ; σ_p is high and σ_w is low compared to what researchers have found in other countries. Both of these contribute to the development of the manufacturing sector. Secondly, the population growth rate equation is one where fertility rates adjust instantaneously to changes in the population's distribution. Judging from

⁵Agricultural development is usually seen in terms of improvements in productivity through better crops and higher utilisation rates of modern inputs. I know of no national plan where a population programme forms an integral part of rural development plan nor of any major institution which advocates such a policy.

postwar demographic patterns in Africa and Asia such a dramatic responses to modernization is not likely to be the rule. The model considered here is thus more prone to successful development than models which might be based on a more representative country. When these facts are coupled with the extremely low depreciation rates (2.0 and 1.5 per cent) it becomes very difficult to imagine an expansionary development programme on a set of investment rates which does not meet the minimum requirements implied by FF.

Viewing these results in the light of Table IV leads to a very pessimistic out look for the development prospects of large parts of Africa and Asia.

TABLE IV⁶

INVESTMENT, BIRTH AND DEATH RATES FOR SELECTED
COUNTRIES 1970-75

Country	$i_M + i_A$	Birth Rate	Death Rate
Bangladesh	0.09*	49.5	18.1
Burma	0.12	43.7	18.0
Ethiopia	0.11	49.4	25.8
Ghana	0.11	48.8	21.9
Pakistan	0.11	47.4	16.5
*Estimated			

Although there is not much information on the intersectoral allocation of investment most of the countries on the list probably lie to the left of the FF frontier. For them prospects are bleak indeed.

One of the more disturbing aspects of this type of analysis is that failure is caused simply by excessive population growth. And here it is only the "numbers" that are causing the problem. Neither

⁶The data comes from [7 ; 8]

land scarcity nor other factor shortages are present in the model so that diminishing returns is not the source of collapse. That is not to say that overcrowding and rising man-land ratios can be disregarded. For some areas these naturally affect output but the point here is that development may fail to occur when there are no resource constraints. In that sense the "World Dynamics" models are rather optimistic in placing so much emphasis on the resource and factor endowment side of development.

It has already been pointed out that under existing social and economic arrangements, the set of lower bounds implied by the FF frontier is minimal and countries like those listed in Table IV may have to save much more than 12-13 per cent of their gross output in order to achieve self sustaining growth. In some cases this may not be feasible and other alternatives to higher investment rates must be developed. Lower population growth would be most advantageous but as a policy this is extremely difficult to implement as it runs against the interests of large sections of rural society. On the other hand, if governments are prepared to get involved in massive rural development programmes which mobilize underemployed peasants and create new production and investment opportunities then the potential for successful development will be improved. However, until this happens there is not much room for optimism.

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On Food Shortage Forecasting : A Comment

by

MD. MIZANUR RAHMAN*

I. INTRODUCTION

In a recent paper [3], Prof. Manetsch has argued that famine incidents are related to the sunspot activities and hemispheric temperature. However we believe that no such relation actually exists. We shall subsequently show, by using the data provided by Manetsch, that there is no evidence in support of his hypothesis. In fact he has arrived at wrong conclusions through inappropriate hypothesis testing procedure.

II. NATURAL CALAMITIES VERSUS SUNSPOT CYCLE

The author has not mentioned by what criteria he has selected the segments of the sunspot cycle to be tested for their susceptibility to famine. On an inspection of the following table adopted from his paper, it appears that he has selected the segments with the largest frequencies, except only in the case of storm waves in the Bay of Bengal where segment VI is selected instead of segment I though the latter has experienced more storm waves than the former. He has apparently resorted to arbitrariness in selecting a segment out of two, having the same frequency of calamity. Thus in the case of Russian

*The author is a Staff Economist at the Bangladesh Institute of Development Studies. He wishes to express his deep gratitude to Dr. Kazi Saleh Ahmed, Associate Professor at the Department of Statistics, Jahangirnagar University for his comments on an earlier draft which led to substantial improvement of the paper in both argument and presentation. The author acknowledges valuable discussions with Dr. S. R. Osmani Research Economist at the BIDS and A. F. M. Habibul Huq, Lecturer in the Department of Statistics, Jahangirnagar University. However the errors if any remain with the author alone.

famine, he selects segment V though segment IV has the same frequency as the former.

TABLE I

Country	Type of Calamity	Period	Frequency of Calamities During Sunspot Cycle Segment						Total Number of Calamities	For the Segments Considered	
			I	II	III	IV	V	VI		No. of Segments	No. of Calamities
India	Famine	1600-1970	7	(16)	3	7	4	(10)	47	2	26
Russia	Famine	Not mentioned	(5)	(4)	2	3	(3)	0	17	3	12
Bangladesh	Storm-waves	1787-1945	5	(8)	2	(8)	1	(3)	27	3	19

Note: The brackets denote the segments selected for testing.

On close examination it would appear that the author's hypothesis testing procedure is essentially a binomial one which dichotomises the sunspot cycle—one portion comprising the segments that are to be tested for susceptibility to calamities and the other comprising the remaining segments. This procedure and the conclusions deduced therefrom would have been all right if the segments for testing susceptibility to calamities were selected by such criteria as do not depend on the data. But if the segments with the largest frequencies are selected for testing, then the set of segments to be tested will not remain constant from sample to sample. So the conventional binomial test is not appropriate in this situation. An alternative test procedure is described below.

If the segments with the largest frequencies are selected for testing their susceptibility to calamity, then since the sunspot cycle is divided into six segments, the data should be regarded as hexanominal. Moreover, while constructing the test, we should take into account the fact that the segments with the largest frequencies have been selected for testing. The null hypothesis would be that the frequency of calamity does not depend on the segments of the sunspot cycle (i.e., calamities are equally frequent in all the segments). And if the probability of more extreme observations than those in our data is small, we would have genuine doubts as regards the correctness of the null hypothesis; if

it is large we may infer that the data provide no evidence against the null hypothesis. Let us denote the following :

N = Total frequency of calamities during the whole period.

c = Any possible combination of frequencies over the 6 segments such that total equals N .

$n_i(c)$ = Frequency of calamities in the i th segment, for a given c .

$x_j(c)$ = Number of segments in the j th group of segments having equal frequencies in a combination c .

k = Number of segments chosen for testing susceptibility to calamities.

W = Set of all c 's satisfying the condition that the sum of the largest k frequencies is not less than the sum of the largest k frequencies observed.

$p(c)$ = Probability of occurrence of any c .

Then the probability of more extreme observations than those in the data is given by

$$P = \sum_{c \in W} p(c) = \sum_{c \in W} \frac{6!}{\prod_j (x_j(c)!)^6} \cdot \frac{N!}{\prod_i (n_i(c)!)^6} \cdot (1/6)^N$$

The results of our calculation with those of the author are presented in the table II.

It appears that the actual values of critical probability are much higher than those calculated by the author. For the cases of Russia and Bangladesh, we may safely conclude that the data provides no evidence in favour of the hypothesis that calamities are correlated with the sunspot cycle. However, for the Indian case, the critical probability, which is equal to 0.056, is rather low. But one should also take note of the fact that here only two segments have been considered unlike the other two cases where three segments were considered. Thus the element of arbitrariness in not pre-selecting the number of segments to be considered for testing has contributed to the acceptance of the hypothesis of correlation.

TABLE II

Country	No. of Segments Considered	Frequency of Calamities During the k Segments of Largest Frequencies	Total Number of Calamities in the Whole Period	Probability of n or more Calamities During the k Segments of Largest Frequencies	
				Present Commentator's Calculation	Author's Calculation
	(k)	(n)	(N)		
India	3	26	47	0.056	0.003
Russia	3	12	17	0.651	0.072
Bangladesh ^a	3	19	27	0.400	0.030
Bangladesh ^b	3	21	27	0.220	0.003 ^c

Note: ^aFollowing the author, segment VI is considered though it has less frequency than segment I which has not been considered, and the critical probability is calculated for the three segments with the largest frequencies totalling 19.

^bFor the alternative case when segment I is considered instead of segment VI.

^cCalculated by the present commentator using the binomial assumption of the author.

Suppose that on obtaining the data, we examine whether for a single or more than one segment we can get a significant result at a given level by the binomial test. For the Indian case, the probability that a significant result will be obtained in this way at 0.003 level is 0.13. In this connection it may be mentioned that if one had tested at the customary 0.05 level¹ then the probability of an apparently significant result would be 0.58. Therefore we find that one is quite often likely to unawarily get a significant result by the binomial test which may not turn out to be at all significant if tested by an appropriate test. Likewise for Russian famine and storm-waves in the Bay of Bengal the probabilities evaluated without restriction on the number of segments would be greater than the probabilities shown in the above table.

III. FAMINES VERSUS INTENSITY OF SUNSPOT ACTIVITY

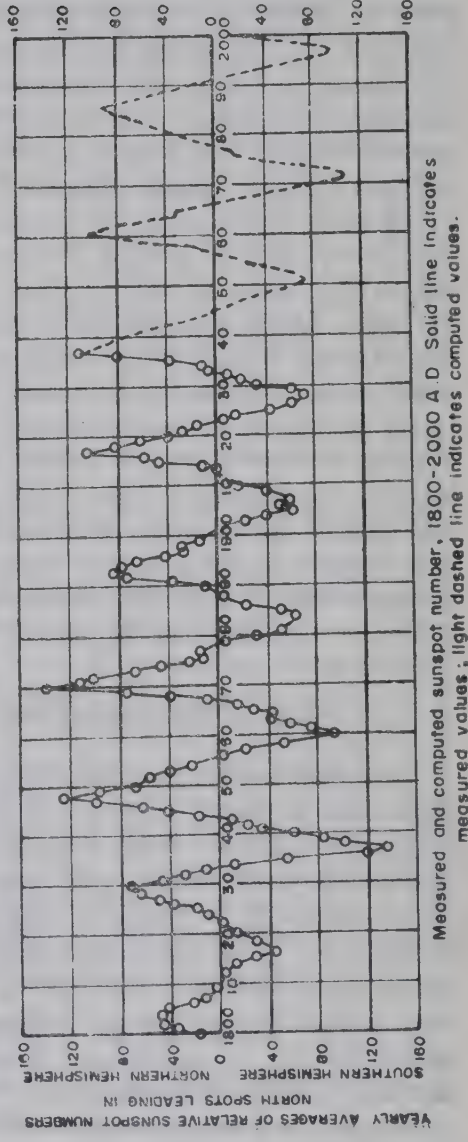
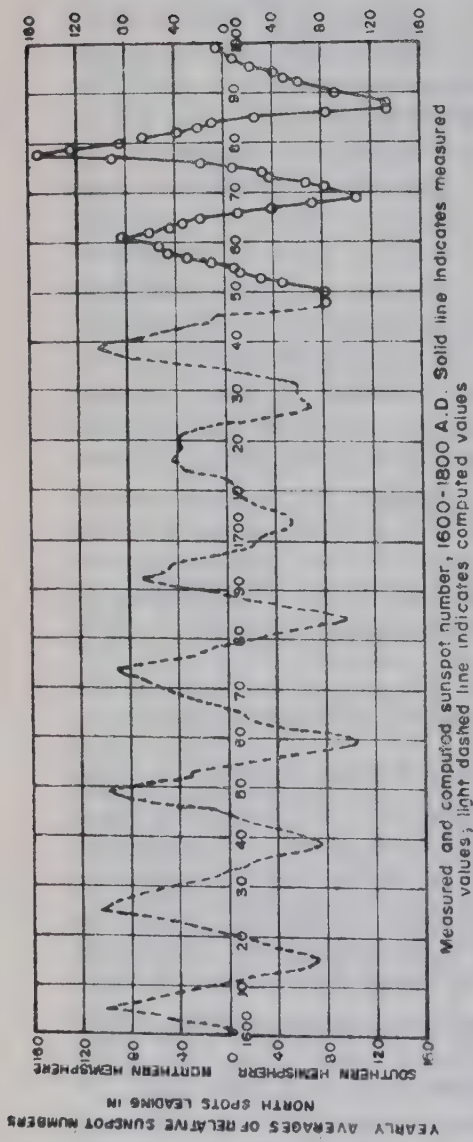
Prof. Manetsch observes that during the period 1600-1970 A.D. the maximum number of famines per decade in India was four. This

¹ In examining the influence of hemispheric temperature on famines in India and Russia, the author has employed a level greater than 0.05.

happened three times e.g., during 1780-90, 1830-40 and 1860-70. He says that these three periods correspond to three different abnormal states of sunspot activity and therefore concludes that famines might be related to "the intensity of sunspot activity or its rate of change with respect to time". But the basic question is how do we know that the states of sunspot activity during the above mentioned three periods were abnormal. The sunspot numbers compiled and extrapolated by Anderson [1] are plotted in figure 1. One may easily see that there are so many varied states of sunspot activity. Who is to tell which ones are abnormal ? Thus in the absence of any *a priori* definition of abnormality, the conclusion of Prof. Manetsch does not follow from the data. Rather the opposite to what he intended has resulted from his endeavour because of scantiness of data (i.e., only three decades of heavy famines). Instead of showing that famines are more frequent during periods of abnormal sunspot activity, his effort only amounts to saying that since frequent famines did occur during the above three decades, the states of sunspot activity prevailing during those decades may possibly be abnormal. But that is also of trivial nature since the three decades of heavy famines correspond to three different states of sunspot activity. Thus there being only one decade corresponding to a level, we have no scientific basis for any kind of inference.

IV. FAMINE VERSUS HEMISPHERIC TEMPERATURE

We fear that the following statement of Prof. Manetsch, "draught and famine are more likely during periods of lower mean hemispheric temperature" does not follow from the theory of Bryson and Dittberner. Even if it is taken to hold good, then one should also go, in the same line of argument, to infer that higher mean hemispheric temperature should cause more rains, and still higher hemispheric temperature should cause excessive rains resulting in floods and famines. In fact, flood induced famines are not infrequent in some parts of the Indian subcontinent e.g., in Bangladesh. Therefore it appears that Prof. Manetsch has tried to verify only one of the two propositions that may possibly follow from Bryson and Dittberner's theory if it at all follows. However in that case he should have excluded the famines caused by floods but he has not done so.



We reproduce the following table from the paper of Prof. Manetsch to facilitate discussion. The frequencies of famine during the periods

TABLE III
INDIAN FAMINES PER DECADE VERSUS MEAN HEMISPHERIC
TEMPERATURE

Cool Hemispheric Temperature (1600-1880 A.D.)	Warming Hemispheric Temperature (1880-1910 A.D.)	Warm Hemispheric Temperature (1910-1940 A.D.)
1.46	1.33	0.33

of cool and warming hemispheric temperature are not at all statistically different and this small difference may easily happen due to chance especially when the span of the latter period is comparatively small. However the frequency of famine during the warm hemispheric temperature shows some significance ; this might furnish some evidence in favour of the author's hypothesis. Now let us examine the issue more closely. If the author's hypothesis is correct, we naturally expect that the per acre yield of foodgrains should increase over the warm period 1910-40 during which the mean hemispheric temperature increased by about 0.4 degree centigrade. But the contrary did happen. Blyn's [2] painstaking estimates show that between 1910 and 1940, the per acre yield of foodgrains² declined by 16.52% whereas that of rice declined by 22.14% in British India. The per capita figures were even more serious. The per capita foodgrain output declined by 29% and per capita foodgrain availability declined by 26% over the period 1911

²Foodgrains consist of rice and wheat besides the minor cereals e.g., jowar, gram, bajra, barley, maize and ragi.

to 1941. Now the per acre foodgrain production is a more direct and possibly the only appropriate measure of the effect of the mean hemispheric temperature on foodgrain position via monsoon rains (or weather) than the occurrence or non-occurrence of famines. Therefore one should be more inclined to take as correct the evidence furnished by foodgrain yield-rate data rather than that by famine data. Thus one may well assert with justification the opposite of the author's hypothesis. But we refrain from taking either view, in the absence of a more detailed investigation.

V. CONCLUDING REMARKS

We have shown to be spurious the finding of correlation of famines with the segments of the sunspot cycle, the intensity of sunspot activity and the mean hemispheric temperature, and also the correlation of storm-waves in the Bay of Bengal with the sunspot cycle. Therefore the projection of incidences of famines and storm-waves into the future does not hold good. These incidences are expected to happen randomly over time without any correlation with the sunspots or the mean hemispheric temperature.

We believe, however, that Prof. Manetsch's effort to correlate incidence of famine with geophysical factors is subject to even more fundamental criticism. Even if these factors were to be systematically related to the incidence of famines, it could only happen through the reduction in food supply. But the crux of the matter is that famines can certainly take place even without a decline in food supply, as Sen [4] has shown to have been the case during the Great Bengal Famine of 1943. In fact, as the recent famine of 1974 in Bangladesh has shown, famine may appear even before the actual decline of the output to be harvested. This happens to be so because severe destruction of the crop due to drought or flood reduces the demand for labour leading to the development of widespread unemployment which in turn leads to abnormally low level of wages. On the other hand, price of foodgrains soars skyhigh because in anticipation of lower availability in future, large farmers who usually market substantial portion of their surplus foodgrain during the growing period of the crop withhold the

surplus stock for their own consumption, and the grain dealers take advantage of this situation. Thus unemployment, low wages and high food prices combine to reduce drastically the real income of the labourers and the small farmers who depend partly on wage employment for their subsistence. This is when the famine is first felt, and when subsequently the affected crop is harvested, the actual food shortage intensifies the crisis and the relatively better off classes are also affected.

Thus although geophysical causes may precipitate a famine through their effect on both anticipated and actual food supply, the actual appearance of famine and the severity of its incidence will depend on the technological and socioeconomic milieu that determines the staying power of the people against sudden adversities. When the people "are close to the subsistence level already and when they possess very few saleable assets" [4] even the slightest disturbance can spark off a famine. On the other hand, at a higher level of living and with more equitable distribution of income and assets, even a relatively more severe natural calamity may not lead to serious crisis.

Therefore, given that droughts and floods are randomly distributed over time, the frequency of famine in a locality will be largely determined by the socio-political situation prevailing during the period in question. Consequently, any attempt to establish a systematic relationship between geophysical factors and incidence of famine without any reference to the state of the society is methodologically wrong.

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On Food Shortage Forecasting : A Rejoinder

by

THOMAS J. MANETSCH

I am indebted to Md. Mizanur Rahman for pointing out an error in the approach used to test for relationships between the solar cycle and famine incidence and storm waves [1]. The procedure used did, in fact, significantly underestimate the probabilities of the observed events occurring by chance alone. I agree with some of the conclusions he draws from his analysis but I disagree with others. The following discussion elaborates. For completeness the discussion will include relevant results from studies not cited in [1], namely [2 ; 4 ; 5].

With respect to the commentator's hypothesis testing procedure it should be pointed out that he has introduced error into the calculation of the probabilities of calamities occurring by chance. This is because in his use of the hexanomial distribution he has apparently assumed that each phase of the solar cycle as defined is of equal length ($1/6$ of the total cycle). In fact, the peaks of the cycle (segments V and VI) are $1/12$ or less of the total cycle. This fact will be of particular significance in the case of Indian famines where 10 famines occurred during phase VI of the cycle.

In the South Asia cases, chi-square goodness of fit tests were subsequently used by this author to test the hypotheses that observed storm wave incidences and Indian famine incidence reported in [1] occurred due to chance alone (e.g., that the distribution of these over the sunspot cycle followed a uniform distribution). In the case of storm waves the appropriate chi-square test gave no basis for rejecting the hypothesis that chance alone was operative. In the case of Indian famines, however, we would reject the hypothesis of chance acting alone at the 20%

level of significance. While this level of significance is small enough to suggest possible impact of solar activity upon food supply it is not convincing in and of itself. There is, however, evidence that monsoon rainfall in the Indian sub-continent may well be influenced by the solar cycle (through possible mechanisms in the upper atmosphere currently under study by atmospheric physicists). While the time series in this case go back only to 1900, Jagannathan and Bhalme [2] report evidence of correlation between the solar cycle and the amount and distribution of rainfall from the Southwest monsoon. (This work associates both temporal (within year) and spatial rainfall distribution to phases of the solar cycle.) Taken together the above raise significant questions for decision makers and planners concerned with, for example, management of water resources, production planning and food storage policy.

With respect to possible influences of sunspot activity intensity and its rate of change upon the incidence of calamity, the commentator raises the question of what "normal" sunspot activity is. Examination of his Fig.1 indicates that sunspot activity reached abnormally large intensities (relative to the remainder of the data displayed) in 1778, 1788, 1838, and 1870. Three of these four peaks are associated with decades of unusual famine incidence in India. The fourth peak, 1788, occurred just two year prior to a decade of heavy famine incidence.

There is also, however, the fundamental question of the impact of climatic change upon food supply in the Indian subcontinent. In particular, there is evidence to support the conclusion that rainfall in India is related to mean hemispheric temperature and its rate of change with respect to time through, presumably, the impact of these upon global air circulation in general and the Southwest monsoon in particular. The history of Indian famines [5] suggests that irregularities in the Southwest monsoon has been an important "trigger" mechanism for famines in India prior to 1900. Figure 1 graphs mean temperature in Iceland since 900 A.D. (accepted by climatologists as a proxy for mean hemispheric temperature [3]) and recorded famines in India over the same period of time. (These data were the basis for Table III of [1]). This figure helps put the past 75 years in perspective—with respect to famine incidence they are certainly not typical of the past 500 years. During this period, high famine incidence is generally associated with low mean

hemispheric temperature. Further, Brinkman [4] has related the decadal rainfall (R) at several stations in northwestern India to the decadal mean temperature (T) and its time rate of change in Iceland. For Bikaner and Jodhpur the relationship is

$$R = 98.56 + 8.40T - 14.08 \frac{\delta T}{\delta t} ; r^2 = .83$$

On the basis of the historical temperature data of Figure 1, the "T" term in this equation, historically, could account for as much as $\pm 8\%$ variation in observed average rainfall and the $\frac{\delta T}{\delta t}$ term as much as $\pm 7\%$ variation. This, however, leaves unanswered the important question of how climatic variables might influence the temporal (within year) distribution of rainfall.

The commentator has pointed out that if low mean hemispheric temperature corresponds to times of food shortage then times of high mean temperature should correspond to times when food is relatively abundant. He points out that per capita food grain production declined significantly in India during the warm period since the early 1900's and uses this fact as evidence against the hypothesis that food shortages relate to low hemispheric temperatures. The use of per capita data here is questionable, however, since the Indian population expanded rapidly during this period of time. Another relevant factor to consider here is the temporal distribution of food production (its' year to year variance). Aggregate food supply statistics may be impressive but large year-to-year fluctuations can wreak havoc.

Other important questions arise :

- (1) What further research can produce additional evidence to bear on the effects of climatic variables on Indian rainfall ?
- (2) If, as the evidence indicates, there is a significant relationship between mean hemispheric temperature and its rate of change (and intervening variables such as air mass circulation) and amount of rainfall (and perhaps its temporal distribution) how are these variables changing from year to year and how can this information be used in planning related to food supply and distribution ? (Climatologists are divided as to whether mean hemispheric temperatures currently are rising or falling.)

- (3) Is it likely that "nature" will be as kind to the Indian subcontinent in the years ahead as she has been in the past 75 years ?

The history of Indian famines has shown that decisive collective action can dramatically reduce the human suffering and mortality caused by food shortages. It is encouraging to know that even if "nature" isn't kind in the years ahead there are things to be done which can reduce this human suffering and starvation.

MEAN ANNUAL TEMPERATURE IN ICELAND¹ AND NOTABLE
FAMINES IN INDIA² SINCE 900 AD

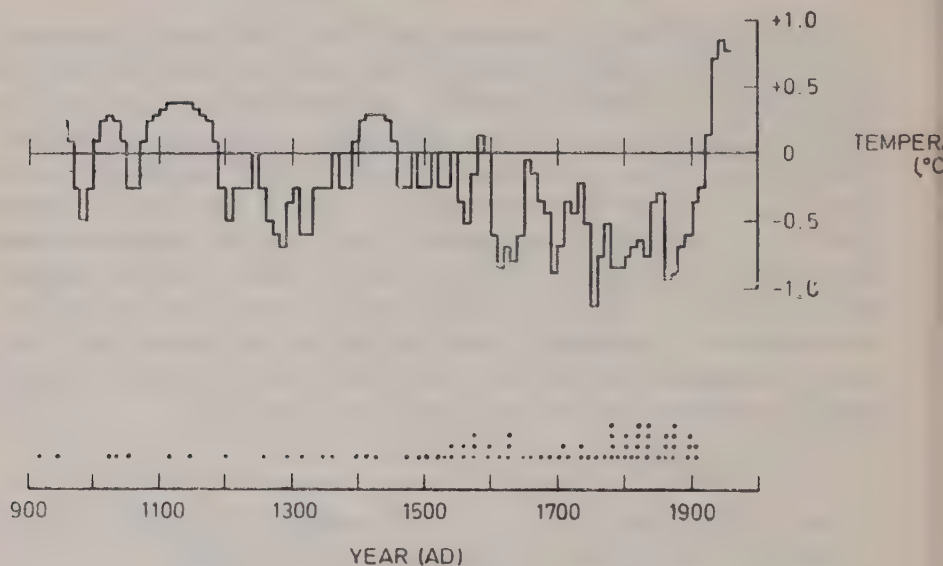


Figure 1

Source :

- 1) P. Bergthorsson, Preliminary notes on past climate of Iceland. Informal notes, Conf. on the Climate of the 11th and 16th Centuries, Aspen, Colo., June 16-24, 1962.
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Book Review

Planning with Social Justice : The Bangladesh Case, by M. RAIHAN SHARIF, Published by Bangladesh Book International Limited, Dacca, 1979. (pp. V+324), Tk. 75.00 (inland), \$7.00 (foreign).

It is now a part of conventional wisdom among economists and other social thinkers that development must ensure growth with social justice. But the planners in developing countries, and the international development agencies are still groping about for development strategies and planning techniques which can ensure growth with social justice. In this book Professor Raihan Sharif who had long experience with planning in Pakistan, has put in ink his own thinking on the subject.

The author begins with the argument that the planners in developing countries cannot take any guidance from the classical and neo-classical growth theories (Chapter I). Even the theoretical framework of political economy which focusses on distribution of production instead of efficiency for growth, such as Edward Nell's paradigm, is of little relevance. The main reason is the dominance of the subsistence sector in these economies, and the considerable influence of public ownership and management on the market sector. These countries, thus, have to make their own innovations about planning approaches and techniques.

The author then summarises the main argument of the book in Chapter II in which he argues that the planners in developing countries, should start first by defining an objective function of planning exercise, i.e., by explicitly stating and identifying an appropriate set of development indicators. They should discard the conventional indicator of per capita income growth, as it does not guarantee that the level of living of the common man would be improved. Instead the objective function of planning should be (i) fair distribution of increased incomes and (ii) maintenance of a threshold minimum income for the people below a poverty line. In other words planning should be for improving and

maintaining social justice. The basic elements in the new strategy which the author suggests are (i) a technological change in favour of capital saving, labour intensive techniques, so that employment generation is maximised, (ii) institutional changes related to the structure of ownership of property and economic power, and (iii) a decentralised bottom-up planning process so that political participation of the masses is ensured. With regard to sectoral allocation of resources the planners need to give a big push in social sectors because these are the sectors with maximum linkage effects, and are most productive in the long run. The author, however, recognises that in view of resource limitations the possibility of a 'social-big push' is rather bleak for many developing countries.

Chapter IV and parts of Chapters IX and XIII deal quite at length with the problems of appropriate technology and employment maximisation. The author argues that in developing countries technological change in line with their factor endowments is difficult to achieve, because of dependence on foreign aid and inappropriate educational system. For maximising employment the author suggests shifting of planning strategy from urban-based to rural-based development, which will also check the recent flow of excess labour from rural to urban areas.

The author takes up the perspectives of planning and the issues of plan formulation in Chapters VII and X. He is against the use of sophisticated quantitative tools in planning but he is also against unplanned development. Planning is useful for avoiding misallocation of resources, for influencing in the 'right' manner consumption, savings and investment and other economic processes, which lead to a level of economic development, and for developing the economy according to social priorities.

Chapters XII and XIV outline the institutional changes and socio-political framework needed to make planning with social justice a success. The author explains the existing institutional structure and the process of exploitation, and analyses their impact on growing inequality. He argues that in many developing countries, the class struggle is not intensified enough to lead to a social revolution. So structural changes through a drastic land ceiling and land redistribution programme

are needed. For Bangladesh he suggests a ceiling of 5 to 7.5 acres. The author is, however, apprehensive of the impracticability of such institutional changes in the existing socio-political structure in many developing countries, especially in Bangladesh. The overall social transformation is to be brought about by a synthesis and integration of the political process, social process and economic progress, which constitutes a challenge to planners and politicians in Bangladesh,

On resource mobilisation for planning the author argues that there is a case for public saving and investment, because the masses are so poor that the scope for private saving and investment are limited. Foreign aid is helpful in augmenting the meagre domestic resources, but aid should not be misutilised and development with aid should be planned in such a way that the dependence on it is gradually reduced. Proper planning with emphasis on labour saving technology and rural works programme can transform much of the 'surplus labour', the most abundant resource in these countries, into savings. In the suggested basic needs-oriented planning, an important source of savings is the squeeze of consumption of luxury items, and reduction of comforts of high income and middle income groups.

There are two chapters in the book on international economic order and foreign aid. Apparently these chapters do not fit in the book, but they may be taken as issues of international development with social justice. The author speaks about the unequal benefits from world trade for the developing countries and explains the importance of UNCTAD in getting trade concessions and aid from the developed countries, to compensate for the unequal benefits. From recent experiences it is contended that developing countries should not expect much from developed countries as the latter would not sacrifice their own interest. Bangladesh should look more to the Islamic countries who do not follow conventional banking principles. The amount of aid that is flowing from the developed to the developing countries is insufficient for the needs of the latter. Also, the aid has a low 'grant element' measured in terms of the real cost of aid to the aid giving countries. The author argues that foreign aid is not allowing the developing countries to expand the exports of their manufactured goods or to develop the prospective import substituting industries. For aid to be really effective, aid policies should support rather than restrict trade

and provide opportunities of promoting trade among developing countries themselves.

The above theme clearly shows that the book is rich in content. The author discusses the various issues quite extensively and with an elegant language. In fact in parts of the book the discussion is so lengthy and verbose that a reader merely interested in development and planning may lose his concentration and the book may seem unreadable.

A major weakness of the book is the presentation of materials. From the present organisation of Chapters the book may look like a collection of unrelated or partially related essays. This is also partly responsible for repetition of issues here and there. Yet the book has a coherent theme. Some more work for linking various aspects and a concise presentation could make the book a valuable contribution to development economics. There are a few sections and chapters which do not fit in the book, or are ambiguously presented e.g., the chapter on Perspective of Development Potential, and the speculative observations (section V) in Chapter I. In the latter section the author tries (vaguely) to explain the relationship between the public and private sectors. Here, the terms are not well explained and the method of national income accounting used by the author is not made clear.

As regards professional style, the author does not follow any standard system of reference. There are references at the end of the first two chapters but they have different styles. Most of the other chapters do not have any reference or footnotes. There is a list of selected references at the end of the book, but a few publications referred in the text are missing there.

In spite of the above weaknesses, the book would be very useful to planners, economists and other social thinkers both in Bangladesh and abroad.

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